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The Distribution of Petroleum Residues in Near-Shore Sediments from Atlantic Canada

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Canadian Technical Report of

Fisheries and Aquatic Sciences No. 1612

March 1988

THE DISTRIBUTION OF PETROLEUM RESIDUES IN NEAR-SHORE SEDIMENTS FROM ATLANTIC CANADA

by

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ABSTRACT

Levy, E.M., Lee, K., Saunders, K.S. and Cobanli, S.E. 1988. The distribution of petroleum residues in near-shore sediments from Atlantic Canada. Can. Tech. Rep. Fish. Aquat. Sci. No. 1612: iv + 169 p.

Data from a survey of the concentrations of "petroleum residues" in sediments from harbours in Atlantic Canada in 1978 have been compiled in this report. Statistical analysis indicates that of the samples collected from 65 diverse localities, the mean petroleum residue concentration was 22.9 µg/g (range: 019 - 1145 µg/g). Of the 27 ports with mean petroleum residue concentrations below 10 ug/g (the regulated limit defined by the Ocean Dumping Control Act, based on gravimetric analyses of n-hexane soluble substances) none were major industrial/ residential centers. Elevated concentrations of petroleum residues were usually associated with harbours having oil refineries, industrial activities, and centers of dense population and, in most cases, such contamination could be directly attributed to an obvious local source.

RÉSUMÉ

Levy, E.M., Lee, K., Saunders, K.S. and Cobanli, S.E. 1988. The distribution of petroleum residues in near-shore sediments from Atlantic Canada. Can. Tech. Rep. Fish. Aquat. Sci. No. 1612: iv + 169 p.

On a compilé dans ce rapport les données d'un relevé des concentrations de "résidus pétroliers" recueillis en 1978 dans des sédiments provenant de ports du littoral atlantique du Canada. L'analyse statistique indique que dans les échantillons recueillis dans 65 localités différentes, la concentration moyenne des résidus pétroliers était de 22,9 µg/g (intervalle : 0,19 - 1145 µg/g). Des 27 ports où les concentrations moyennes des résidus pétroliers étaient inférieures à 10 µg/g (chiffre qui correspond à la limite réglementaire définie en conformité avec la Loi sur l'immersion de déchets en mer et en fonction de l'analyse gravimétrique de substances solubles dans le n-hexane), aucun n'était un grand centre industriel ou résidentiel. Généralement, les concentrations élevées de résidus pétroliers étaient associées à la présence de ports équipés de raffineries de pétrole ou d'usines, et de centres urbains fortement peuplés; dans la majorité des cas, on a pu directement attribuer ce type de contamination à une source locale évidente.

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	SAMPLING AND ANALYTICAL PROCEDURES.....	4
3.0	RESULTS AND DISCUSSION.....	7
4.0	SUMMARY.....	10
5.0	ACKNOWLEDGEMENTS.....	10
6.0	REFERENCES.....	11
7.0	APPENDICES	
	7.1 SITE LOCATIONS AND DATA.....	12
	7.2 FIELD LOG.....	132
	7.3 INDEX OF SAMPLE LOCATIONS.....	166

1.0 INTRODUCTION

Pollution of the marine environment has been a world-wide concern during the past two decades, and in 1975, Canada entered into an agreement with some 80 other nations to regulate the amounts of pollutants entering the oceans through waste disposal. This agreement, **The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter** (generally known as the **London Convention**), specifies that participating countries should regulate dumping in marine waters through a permit system and that the dumping of substances that were considered to be harmful to the marine environment (Schedule I) were to be prohibited while dumping of those substances which occur naturally, but which may be harmful at higher concentrations (Schedule II), were to be restricted. Included in Schedule I substances are "crude oil, fuel oil, heavy diesel oil, lubricating oils, hydraulic fluids and any mixtures containing any of them".

The Ocean Dumping Control Act (ODCA), the national legislation through which Canada fulfills its obligations under the London Convention, came into effect in 1975. It is at least as stringent as the international requirements, prohibiting discharges of oil or oily wastes into waters under Canadian jurisdiction and places stringent controls on the concentrations allowable in other substances. It is noteworthy that the beneficial effects of the international controls on the amounts of oil released into the open ocean during the normal day-to-day operations of the marine transportation industry and the stringent national regulations imposed on discharges into coastal waters were almost immediately evident in the Gulf of St. Lawrence. A monitoring program carried out there between 1970 and 1979 clearly indicated that the background levels of dissolved/dispersed petroleum residues declined during the mid 1970's to levels approaching those present in remote areas of the Canadian arctic marine environment (Levy 1985, 1986).

A major problem that is prevalent in Atlantic Canada has been the never-ending accumulation of sediment in harbours and their approaches which has necessitated an on-going program of dredging. In some instances, the dredged materials have been used as landfill or put to other practical uses but, in most cases, they are merely "disposed of" in the most expedient manner. Since the traditional procedure has been to dump the dredged material somewhere else, the disposal of dredge spoils has continually been a contentious issue. The selection of a site is often based more on short-term economies and considerations of what might antagonize the least number of residents and minimize ensuing conflict with fishermen and other users of the marine environment, than on sound engineering practices or environmental principles. The existing regulations, nevertheless, require that the proponent demonstrates that the materials to be dumped do not contain environmental contaminants at concentrations exceeding the permissible levels. For the lack of a better alternative at the time, these levels were defined in terms of the maximum allowable concentration of "oil and grease" (APHA, 1981; Swiss et. al., 1980), a concept which was borrowed from the oil refining industry. For its intended purpose, namely, to control the amount of oil discharged with waste water from oil refineries, the concept of oil and grease and the analytical procedures used to quantify it are appropriate. In such cases, the only hydrocarbons present in the effluent are from the refinery, and the concentration levels are sufficient to be measured by gravimetry or infrared spectroscopy. However, this approach is clearly inadequate for the purposes of the ocean dumping regulations as it could neither differentiate between organic contaminants and natural marine organic materials in the sediments nor provide a reliable quantitative estimate of the concentration of the oil at the levels usually present in the sediments to be dredged. As a consequence, the information required from the proponent often

did not adequately satisfy the purpose for which it was intended, and perhaps worse, the regulating bodies had no idea of the existing levels of oil contamination in the area from which the dredged material was being removed or in the sediments of the proposed disposal site. Thus, there was no sound basis for assessing the integrity of the data provided by the applicant for predicting the probable impact of the dumping operation on the environment.

As a first step in addressing these deficiencies, a proposal was submitted to conduct a survey of the concentrations of "petroleum residues"; i.e., the ill-defined mixture which remains after petroleum-derived oils are subjected to varying amounts of weathering in the marine environment, in sediments from harbours in Atlantic Canada. Approval and funding was granted by the Regional Ocean Dumping Advisory Committee (RODAC) in 1978. The intent of the survey was to collect sediment samples from as many harbours in the region as possible and thereby cover the entire suite of geological environments, industrial areas (e.g., oil refining, shipping, fishing, fish processing, steel-making, manufacturing), and the populated rural settings to be found in the region. The sampling program was carried out in late 1978, prior to freeze-up and the samples were analyzed in early 1979 by Wainwright Analytical & Marine Services, a fledgling environmental consulting company which later foundered. The present project, to complete the study by analyzing the Wainwright data and presenting them in a format that would be of use to regulatory agencies, was also funded by RODAC.

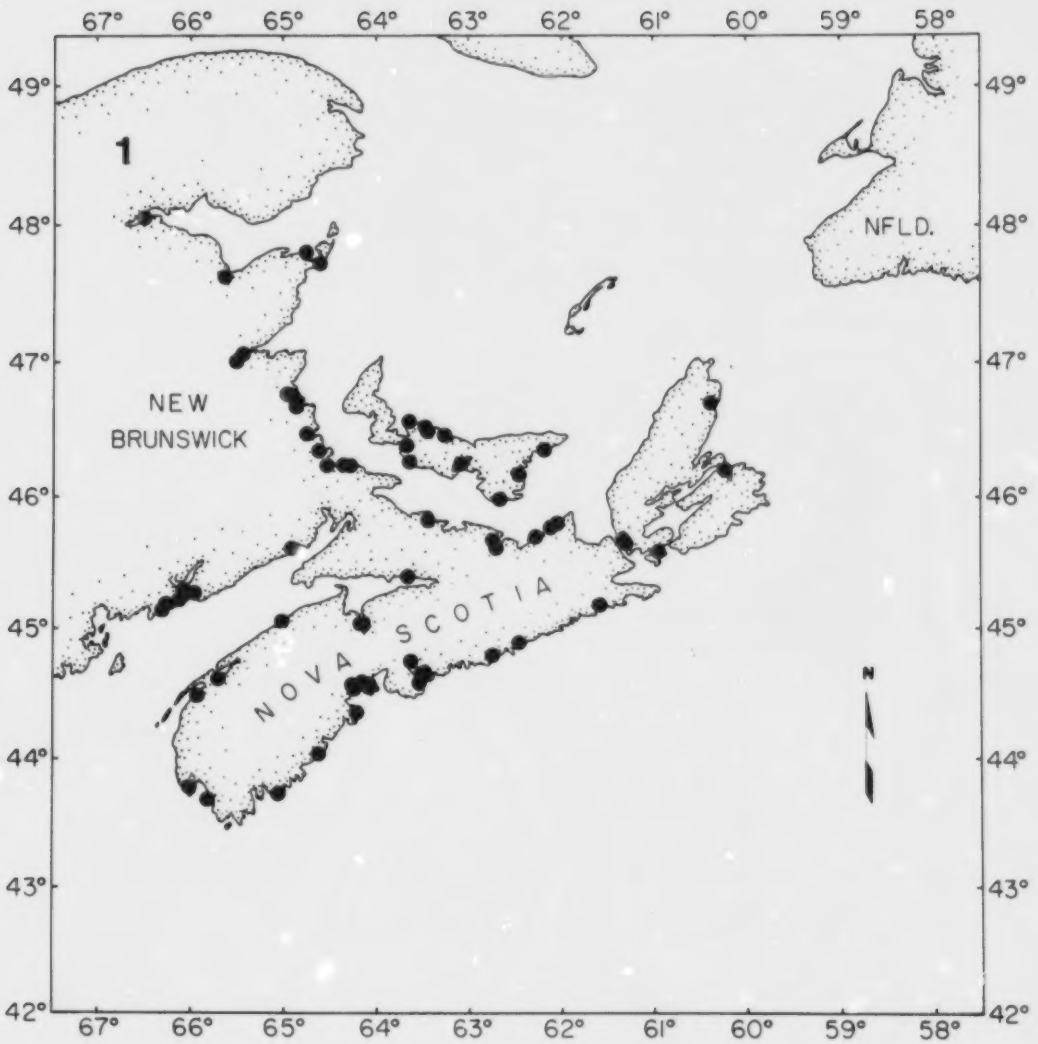
2.0 SAMPLING AND ANALYTICAL PROCEDURES

Sediment samples (1158) were collected at 65 localities on the shores of New Brunswick, Prince Edward Island and Nova Scotia (Figure 1), with a Van Veen grab which was deployed from a small boat or from highway bridges where they crossed narrow estuaries, etc. Subsamples of the sediment were placed in clean glass Mason jars and sealed with aluminum foil placed under the lid. Samples were frozen immediately with dry ice and kept frozen until they were forwarded to freezer storage at the Bedford Institute of Oceanography.

In preparation for analysis, the samples were thawed and a 5 g portion was freeze-dried. A 1 g portion of the dried sediment was weighed and extracted by shaking with 10 ml of aromatic-free hexane. (Any hexane having detectable emission of ultraviolet fluoresence under the conditons of analysis was rejected.) The suspension was then placed in a 50 ml centrifuge tube, using an additional 10 ml of hexane to wash any remaining sediment into the tube, and centrifuged for 5 minutes. The supernatant was removed and made up to 25 ml in a volumetric flask. This solution was placed in 1 cm quartz cells for quantitative analysis by ultraviolet fluorescence spectrophotometry.

Fluorescence spectrophotometry was chosen as the analytical method in this study because it is a cost-effective and highly sensitive method of quantifying the total concentration of non-polar compounds having two or more aromatic rings. These compounds, which are present in most crude oils and fuel oils, are of the greater significance environmentally than the other components. While polynuclear aromatic hydrocarbons are also known to be produced by pyrolysis of organic materials and enter the marine environment via atmospheric processes, from an environmental point of view, it is irrelevant whether the aromatic substances arise from combustion or from direct inputs of oil. Consequently, this approach is ideally suited for the purposes of ocean dumping because it

Fig. 1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provides an "integrated" value for the concentration of the aromatic substances and therefore, a good indication of the "quality" of the substances to be dumped. Gas chromatography was not considered to be an appropriate technique for this program since saturated hydrocarbons are of minor importance environmentally and are produced in abundance by natural biological processes.

The concentration of "petroleum residues" in the extracts was estimated by using a Perkin-Elmer UV Fluorescence Spectrometer (Model MPF-2A) to compare the intensity of emission at 360 nm, upon excitation at 310 nm, with that from a series of solutions containing known amounts of Bunker C fuel oil from the ARROW, a tanker that caused a major spill when it grounded on the coast of Nova Scotia in 1970 (Levy 1977). The continued use of this oil as reference material has ensured that all data from the Atlantic Oceanographic Laboratory of the Bedford Institute of Oceanography are internally consistent and are free from the ambiguities that would arise if the reference material were changed.

The merits of a medium-aromatic fuel oil as reference material have been endorsed by independent studies as appropriate for the investigation of petroleum-derived contaminants in the marine environment (Anonymous, 1981). Proponents favouring chrysene as a standard maintain that it would be easier to compare the results of different laboratories if a pure substance were used. However, typical of molecular spectra, the excitation and emission spectra of chrysene is a group of very steep peaks and valleys. Thus, the intensity of both the excitation and emission is highly dependent on instrumental settings (i.e., the wavelength settings on the two monochromators and the width of the slits). This renders it very difficult to get precise quantitative results. On the other hand, the spectra from a medium-aromatic fuel oil represents the resultant spectra of a large number of aromatic structures present and therefore, is a broad hump. Consequently, instrumental settings are not nearly as critical. Neither reference

material corresponds exactly to what is actually present in the sample. Data are thus expressed in terms of concentrations "equivalent" to the reference substance. (To enable a comparison with data produced using chrysene as the reference material, the intensity of fluorescence from the reference oil used in the present study is 0.221 times that from chrysene under the same analytical conditions.)

3.0 RESULTS AND DISCUSSION

Data collected by Wainwright Analytical Services Ltd., have been archived in the Chemical Oceanography Data Processing System of the Atlantic Oceanographic Laboratory, Bedford Institute of Oceanography. Statistical analysis of the petroleum residue concentration data for individual locations, including a graphic presentation of their distribution (based on a log scale: 0 - 1 [○], 1 - 10 [⊖], 10 - 100 [◒], 100 - 1000 [●], >1000 [▲] µg/g), is presented in the following report. Obvious errors in the designation of sample site latitude and/or longitude designations by Wainwright Analytical Services Ltd., were corrected using information in the field logs (Appendix 1).

In total, 1158 sediment samples were collected from 65 localities along the shores of New Brunswick, Prince Edward Island and Nova Scotia; the mean petroleum residue concentrations in these samples (range 0.19 - 1145 µg/g) was 22.9 µg/g.

Of the 65 localities sampled, French River, P.E.I. and the Northwest Arm - Halifax, N.S. were the only sites reported to have mean petroleum residue concentrations >100 µg/g (154.2 and 101.5, respectively). The elevated value at French River is attributed to 3 heavily oiled mud samples collected off the boat slip adjacent to the Government wharf (mean oil residue concentration of 13 remaining samples from this locality = 35.2 µg/g). Elevated petroleum residue concentrations (100 - 200 µg/g) in the sediments of the North West Arm -

Halifax, which is used extensively by recreational boats in the summer, were found to be located near mooring facilities and adjacent to a city sewage outfall situated in Point Pleasant Park. The lowest reported concentrations of petroleum residue in sediments (<1 µg/g) were found in Nova Scotia at Bayswater Beach and East River Point Beach, neither of which is located near major industrial or residential developments.

The impact of urban and industrial development on the petroleum residue concentrations in harbour sediments are apparent. For example, the 27 ports with petroleum residue concentrations below the regulated limit of 10 µg/g defined by the Ocean Dumping Control Act, do not include any major industrial/residental centres. At major industrial ports such as Dalhousie, Bathurst, Newcastle, Charlottetown, Pictou, Port Hawksbury, North Sydney, Sydney, Saint John, Yarmouth, Liverpool and Lunenburg, the reported mean oil concentrations were in the range of 10 - 50 µg/g. Mean concentrations of petroleum residues between 50 - 100 µg/g are reported for Halifax Harbour, Point Tupper, Richibucto, Lower West Pubnico and Wood Islands. While high concentrations of petroleum residues may be expected in Halifax Harbour and Point Tupper which are recognized as major ports and industrial centres, such concentrations of oil residues (>50 µg/g) in the smaller ports is unexpected and is attributed to samples being collected from around Government Wharfs and ferry terminals. Samples collected near a wharf or from highway bridges, even in undeveloped areas, may reflect the accumulation of the wood preservative creosote (a distillate of coal tar which consists principally of liquid and solid aromatic hydrocarbons and some tar acids and tar bases), in addition to the discharges of oil from local marine and/or highway traffic. Regardless of the source, it is the overall degree to which sediments are contaminated by aromatic compounds that is pertinent to an assessment of the general "quality" of the material to be dredged and the

potential environmental repercussions of dumping it at a selected site at sea. Variability in the concentration of petroleum residues within sample localities (e.g. 0.99 - 376.5 µg/g in the Halifax Harbour) may be associated with point sources. For example, in the Saint John Harbour, elevated petroleum residue concentrations (>100 µg/g) were found in an immediate vicinity of the Gulf Oil storage facility.

While elevated oil concentrations in smaller harbours appear to be correlated with the fishing industry (for example, the difference between Lismore and Maligant Cove), it is not a reflection of fish oils or fish offal, since the analytical method used, only detects non-polar molecular structures which have conjugated systems of carbon-to-carbon double bonds. That is, it detects primarily condensed aromatic compounds and on the very rare occasions, when they might be encountered, compounds with linear conjugation. Consequently, it is oblivious to "fish oils". Rather, the elevated values represent long-term accumulation of contaminants from ancillary sources such as accidental losses of fuel oil from the processing plants or deliberate discharges of oil from vessels while pumping their bilges or disposing spent lubricating oils.

In using these data for evaluating applications for permits to dump dredge spoils, it should be noted that the concentration of all forms of organic matter, including petroleum residues, is dependent upon the grain size of the sediment, with the highest concentrations associated with the finer sediments. Consequently, grain size should also be taken into account in the decision to grant or refuse a permit.

4.0 SUMMARY

Data from the survey of the concentrations of "petroleum residues" in sediments from harbours in Atlantic Canada in 1978 have been compiled in this report. Statistical analysis indicates that of the samples collected from 65 diverse localities, the mean petroleum residue concentration was 22.9 µg/g (range: 0.19 - 1145 µg/g). Of the 27 ports with mean petroleum residue concentrations below 10 µg/g (the regulated limit defined by the Ocean Dumping Control Act) none were major industrial/residential centers. The highest concentrations of petroleum residues were usually associated with harbours having oil refineries, industrial activities, and centers of dense population and in most cases, the contamination could be directly attributed to an obvious local source.

5.0 ACKNOWLEDGEMENTS

Funds for this project was provided by the Atlantic Regional Ocean Dumping Advisory Committee, Environmental Protection Services, Environment Canada, Dartmouth, Nova Scotia.

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DALHOUSIE, New Brunswick

Dalhousie (population 5650 in 1976), located on the mouth of the Restigouche River, has numerous industrial developments which include mining and smelting, pulp and paper, electrical power generation, oil storage and shipping terminals.

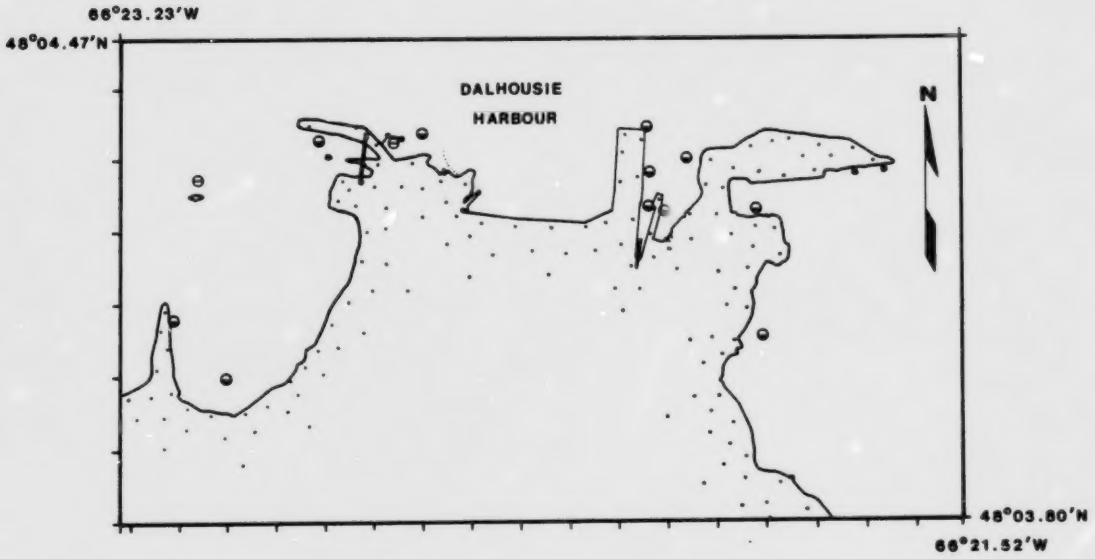
The port is a frequently dredged site and is kept open by icebreakers during the winter. Sediments from the port have been reported to contain elevated concentrations of oil (500 to 1000 ppm). In the present study, intertidal samples could not be obtained from the immediate area due to the predominance of rock fill and/or pulp waste. Sediment samples collected from the boat were mostly sand/silt or silt/clay in nature.

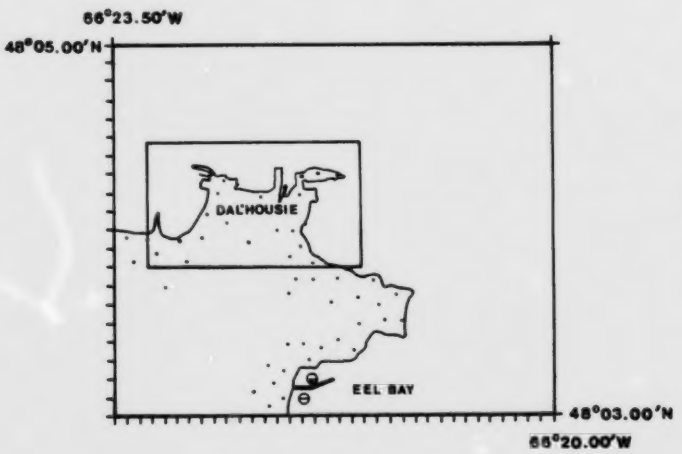
SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0001	48-03.20N	66-21.93W	21.38
0002	48-03.10N	66-21.97W	5.17
0003	48-04.06N	66-21.91W	11.53
0004	48-04.23N	66-21.93W	18.04
0005	48-04.08N	66-23.11W	12.45
0006	48-04.00N	66-23.00W	18.47
0007	48-04.28N	66-23.06W	7.71
0008	48-04.33N	66-22.82W	13.95
0009	48-04.33N	66-22.68W	9.79
0010	48-04.34N	66-22.60W	11.29
0011	48-04.35N	66-22.18W	15.69
0012	48-04.28N	66-22.15W	10.30
0013	48-04.30N	66-22.07W	10.00
0014	48-04.23N	66-22.13W	24.34
0015	48-04.22N	66-22.11W	27.50

VALUES = 15

MINIMUM = 5.17	MAXIMUM = 27.5	RANGE = 22.33
AVERAGE = 14.51	STD DEV = 6.32	STDERR = 1.63
VARIANCE = 39.98	SKEWNESS = 0.56	KURTOSIS = -0.85

Concentration (p.p.m.)	Symbol
0 - 1	○
1 - 10	⊖
10 - 100	◒
100 - 1000	●
> 1000	▲


66°23.23'W
48°04.47'N
DALHOUSIE
HARBOUR
N
48°03.80'N
66°21.52'W


66°23.50'W
48°05.00'N
DALHOUSIE
EEL BAY
48°03.00'N
66°20.00'W

BATHURST, New Brunswick

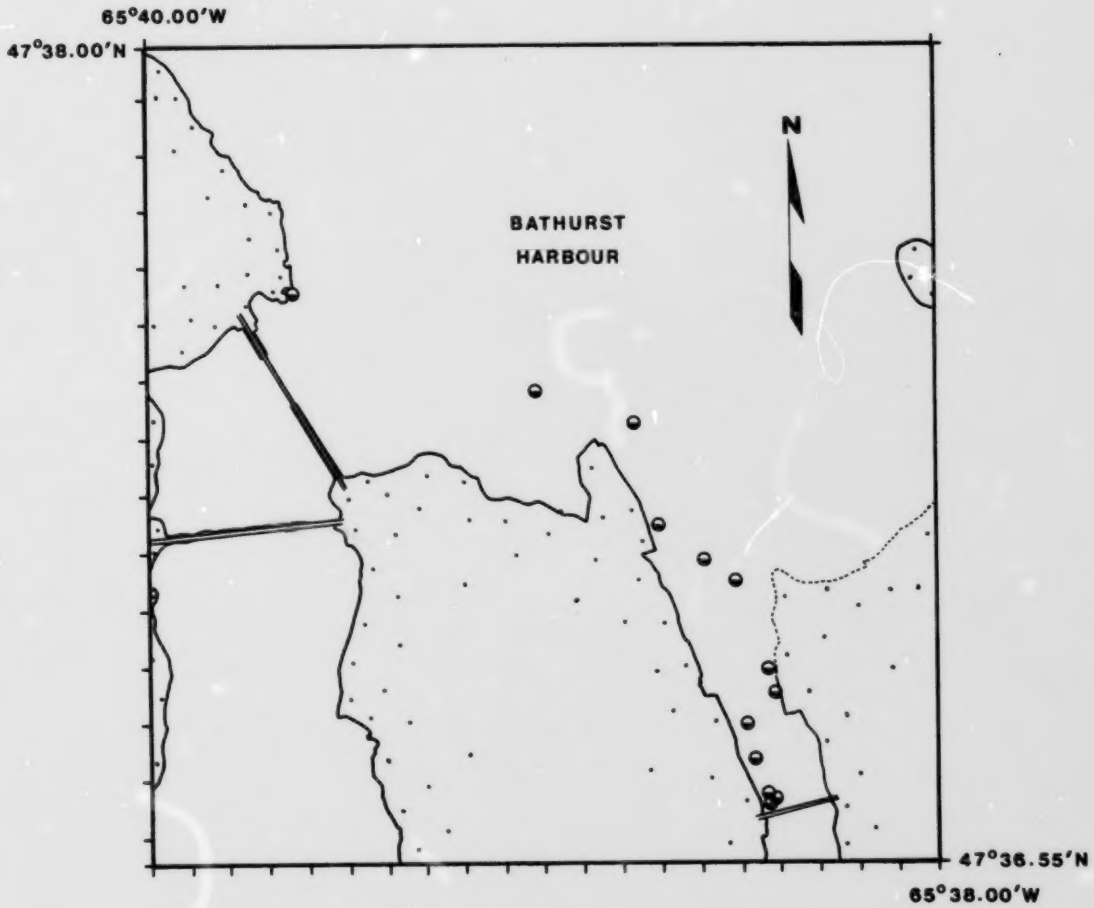
The city of Bathurst (population 16,000 in 1976), located on the south shore of Chaleur Bay, is a centre of industrial activity. In addition to Consolidated Bathurst Limited's pulp and paper mill, facilities for Iriving Oil and the Brunswick Mining and Smelter Corporation are situated in the city. Fishing is not a major industry in the region.

The port has been a site of frequent dredging. Sandy sediments collected from the port have been reported to contain oil concentrations as high as 1000 ppm. In the present study, attempts to sample in areas of eelgrass beds were unsuccessful due to the inability of the Van Veen Grab sampler to penetrate dense rhizoid mats.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0016	47-36.63N	65-38.43W	20.68
0017	47-36.66N	65-38.42W	14.43
0018	47-36.68N	65-38.43W	43.56
0019	47-36.74N	65-38.47W	47.60
0020	47-36.80N	65-38.49W	44.72
0021	47-36.85N	65-38.41W	17.11
0022	47-36.89N	65-38.43W	15.32
0023	47-37.05N	65-38.51W	14.88
0024	47-37.09N	65-38.59W	12.94
0025	47-37.14N	65-38.70W	18.61
0026	47-37.33N	65-38.76W	33.37
0027	47-37.38N	65-39.01W	17.29
0028	47-37.57N	65-39.62W	14.42

VALUES = 13

MINIMUM = 12.94	MAXIMUM = 47.6	RANGE = 34.66
AVERAGE = 24.23	STD DEV = 13.08	STDERR = 3.63
VARIANCE = 171.07	SKEWNESS = 0.81	KURTOSIS = -1.22


65°40.00'W
47°38.00'N
N
BATHURST
HARBOUR
47°36.55'N
65°38.00'W

CARAQUET, New Brunswick

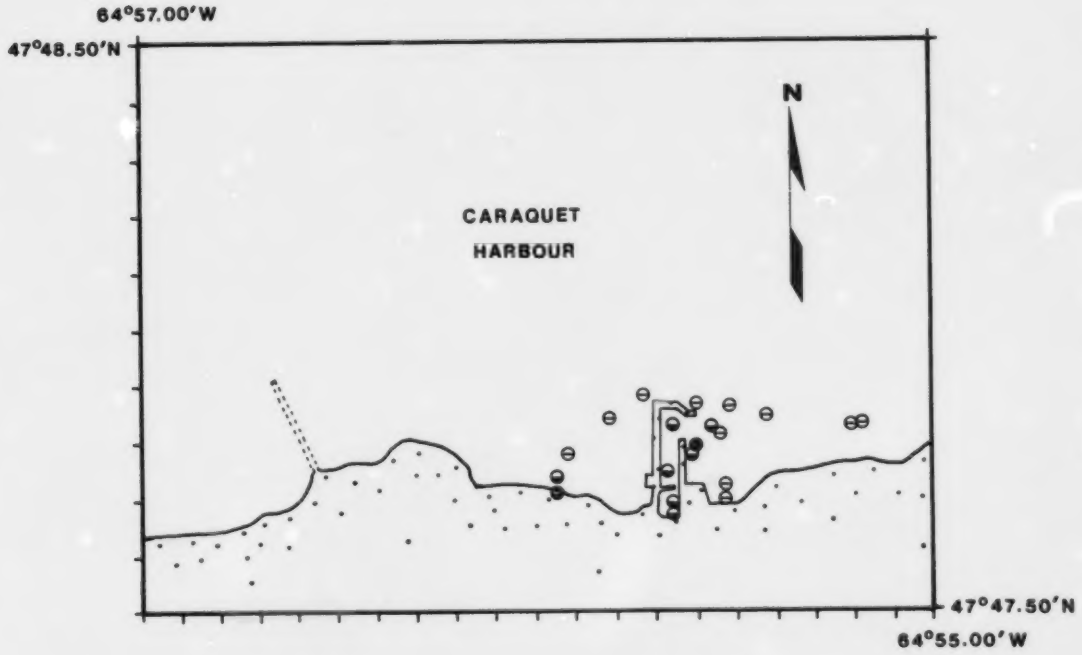
Caraquet is not highly industrialized and has a relatively low population. The primary industry in the area is an oyster fishery.

Caraquet has not been recorded to be a frequent dredging site. Previous analysis of sediments from the harbour composed primarily of sand/silt have shown oil concentrations ranging from 48 to 1100 ppm. A steel piling/rock fill wharf recently constructed west of Young's Wharf does not appear on the charts.

SAMPLE NUMBER	LATITUDE	LONDITUDE	PETROLEUM RESIDUE
0029	46-47.70N	64-55.66W	40.50
0030	46-47.74N	64-55.68W	11.76
0031	46-47.83N	64-55.66W	19.48
0032	46-47.82N	64-55.55W	35.37
0033	46-47.83N	64-55.20W	4.00
0034	46-47.83N	64-55.20W	3.07
0035	46-47.85N	64-55.42W	3.06
0036	46-47.87N	64-55.51W	3.31
0037	46-47.87N	64-55.60W	3.43
0038	46-47.88N	64-55.73W	4.89
0039	46-47.84N	64-55.82W	4.69
0040	46-47.78N	64-55.92W	2.10
0041	46-47.74N	64-55.95W	12.28
0042	46-47.70N	64-55.95W	15.87
0043	46-47.81N	64-55.53W	3.83
0044	46-47.72N	64-55.52W	3.87
0045	46-47.69N	64-55.52W	6.64
0046	46-47.79N	64-55.60W	315.00
0047	46-47.77N	64-55.62W	52.19
0048	46-47.66N	64-55.65W	5.05

VALUE = 20

MINIMUM = 2.1 MAXIMUM = 315.0 RANGE = 312.9
AVERAGE = 27.52 STD DEV = 69.14 STDERR = 15.46
VARIANCE = 4780.1 SKEWNESS = 3.57 KURTOSIS = 11.96


64°57.00'W
47°48.50'N
N
CARAQUET
HARBOUR
47°47.50'N
64°55.00'W

SHIPPEGAN, New Brunswick

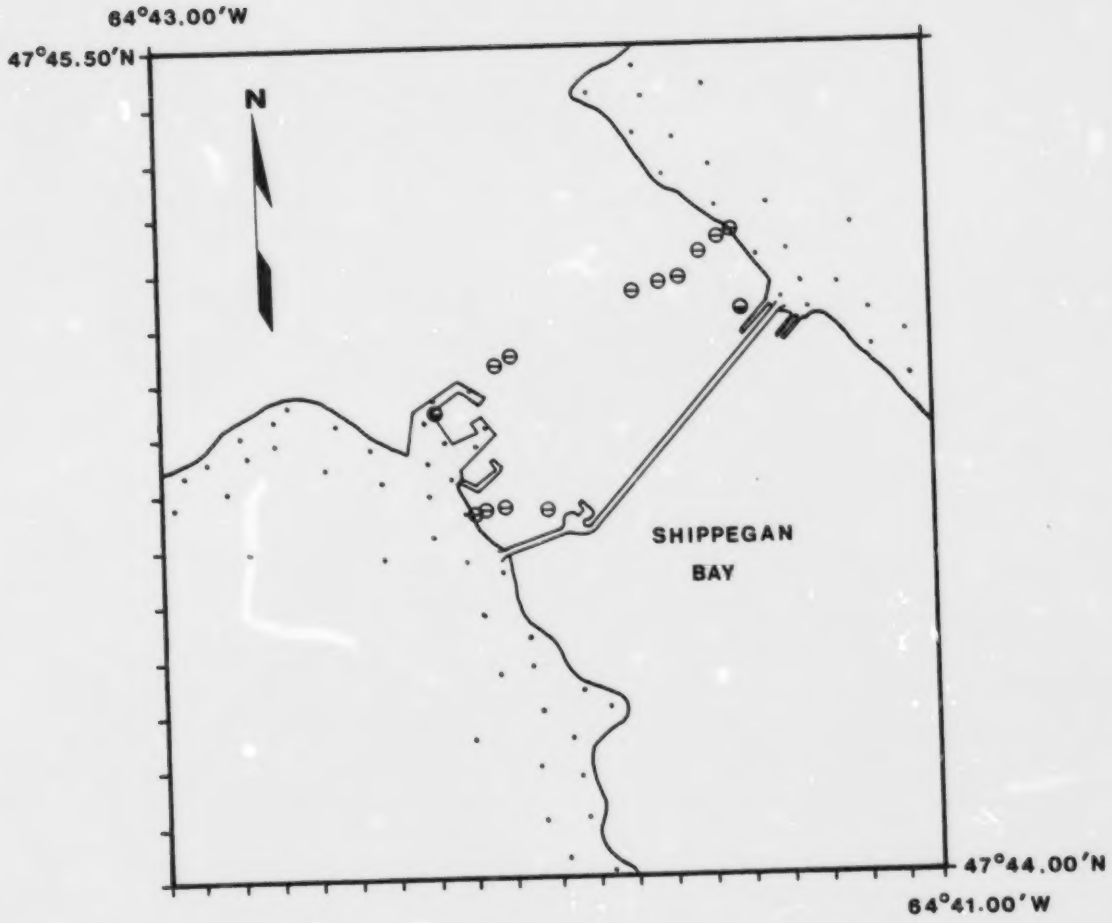
Shippegan (population 2300 in 1976), is primarily a fishing port. The harbour has considerable marine traffic and is serviced by a marine railway used primarily for boat haulage. Cold storage facilities and fish processing plants (eg. National Sea Products) are located within the town.

Shippegan Harbour is reported to be a frequent dredging site; dredging was underway at site #62 at the time of sampling. Sediments from the harbour are primarily sandy in nature although the occurrence of extensive eelgrass beds also suggests areas of high silt content. Previous studies have reported that sediments from the harbour are contaminated by oil (64 to 1500 ppm).

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0049	47-44.93N	64-42.12W	2.56
0050	47-44.94N	64-42.08W	1.44
0051	47-45.06N	64-41.77W	3.74
0052	47-45.07N	64-41.71W	3.49
0053	47-45.08N	64-41.65W	3.69
0054	47-45.13N	64-41.60W	2.66
0055	47-45.15N	64-41.54W	4.21
0056	47-45.17N	64-41.47W	2.91
0057	47-45.02N	64-41.48W	16.86
0058	47-45.84N	64-42.30W	13.96
0059	47-44.67N	64-42.10W	5.48
0060	47-44.66N	64-42.16W	5.33
0061	47-44.65N	64-42.21W	5.10
0062	47-44.66N	64-42.00W	1.83

VALUES = 14

MINIMUM = 1.44	MAXIMUM = 16.86	RANGE = 15.42
AVERAGE = 5.23	STD DEV = 4.52	STDERR = 1.21
VARIANCE = 20.41	SKEWNESS = 1.61	KURTOSIS = 1.21


64°43.00'W
47°45.50'N
N
SHIPPEGAN
BAY
47°44.00'N
64°41.00'W

NEWCASTLE, New Brunswick

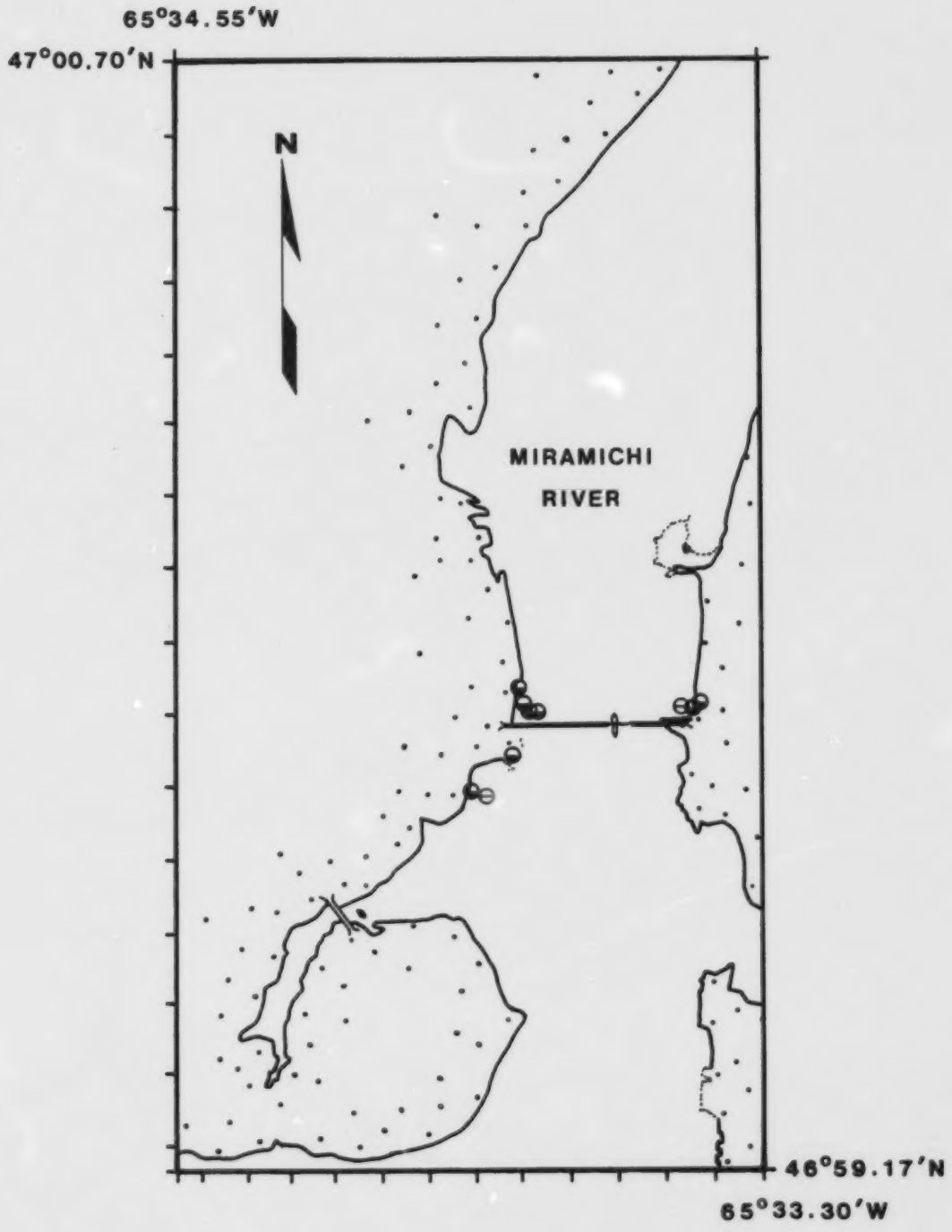
Newcastle (population 6400 in 1976), located 33 miles inland on the north bank of the Miramichi River, is situated within a highly industrialized region which supports facilities for power generation, a dumping ground, the Burchill Mill, Atlantic Sugar Refinery, Canada Cement, Acadia Pulp and Paper, Imperial Oil, and CFB Chatham. The port is maintained in the winter by icebreakers and is a frequently dredged.

Sediments (sand/silt) from the area with oil concentrations up 2000 ppm have been reported. A preponderance of wood fibre in sheltered intertidal areas indicate significant pulp mill activity. The immediate area of Morrissey Bridge is a commercial and residential area.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0063	46-59.71N	65-33.83W	34.20
0064	46-59.69N	65-33.82W	9.64
0065	46-59.75N	65-33.82W	31.30
0066	46-59.81N	65-33.77W	17.44
0067	46-59.81N	65-33.78W	66.88
0068	46-59.82N	65-33.78W	114.10
0069	46-59.87N	65-33.80W	11.22
0070	46-59.84N	65-33.43W	4.70
0071	46-59.84N	65-33.42W	54.93
0072	46-59.84N	65-33.41W	17.02

VALUES = 10

MINIMUM = 4.7	MAXIMUN = 114.1	RANGE = 109.4
AVERAGE = 36.14	STD DEV = 34.04	STDERR = 10.77
VARIANCE = 1158.9	SKEWNESS = 1.09	KURTOSIS = -0.017


65°34.55'W
47°00.70'N
N
MIRAMICHI
RIVER
46°59.17'N
65°33.30'W

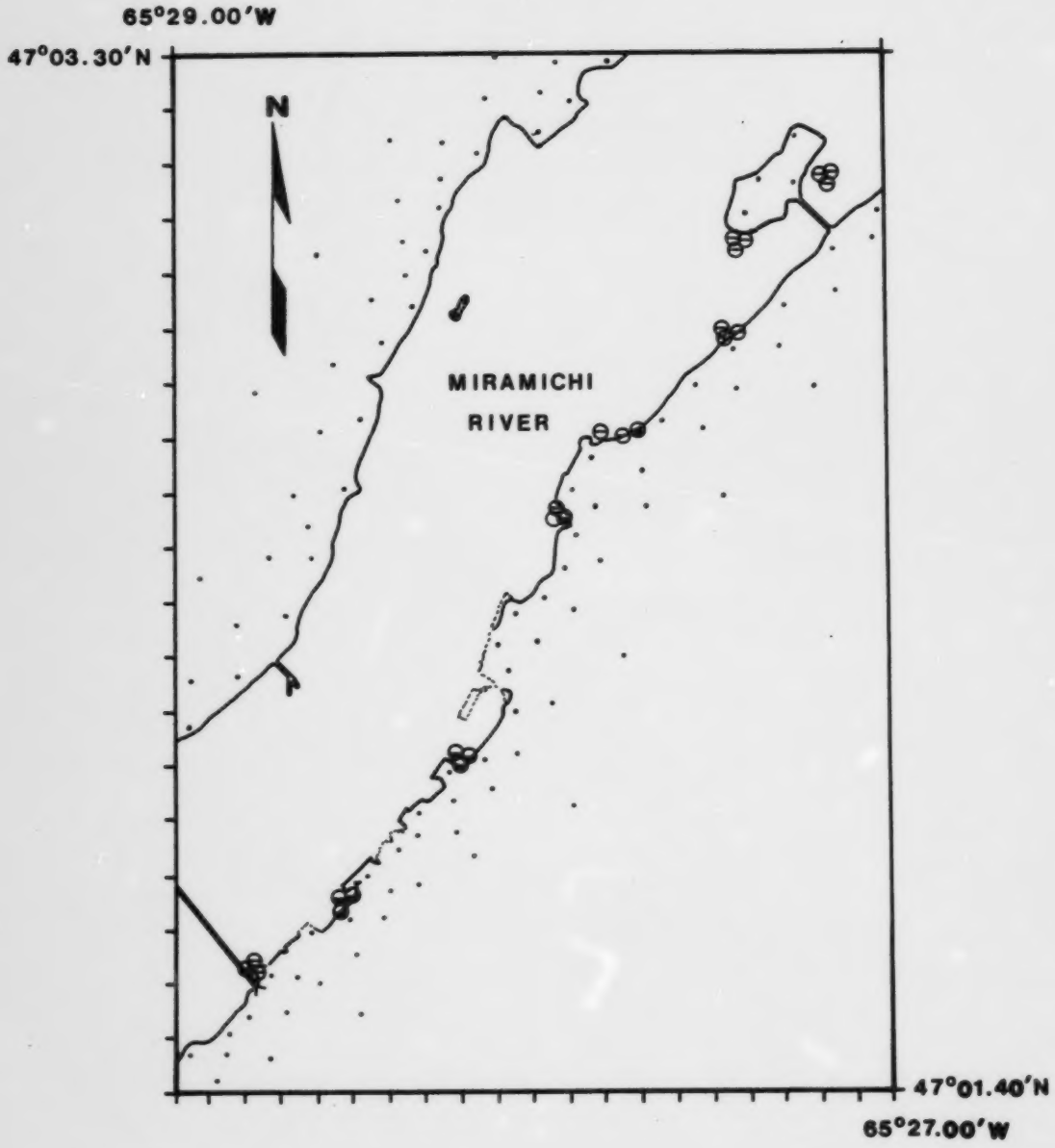
CHATHAM, New Brunswick

Chatham (population 7600 in 1976), is located 28 miles inland on the south bank of the Miramichi River. The port is kept open during the winter by icebreakers. New Brunswick Electric Power Commision operates an oil fired thermal generating station (35,000 KWatts) in the area. The town wharf is now in ruins and is used as a picnic area. The CNR wharf is no longer used for railroad traffic but its condition is being maintained. A sewage treatment facility is located at 47-03.40N 65-27.87W.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0073	47-02.78N	65-27.42W	5.30
0074	47-02.77N	65-27.41W	6.91
0075	47-02.78N	65-27.39W	6.61
0076	47-02.98N	65-27.39W	2.30
0077	47-02.98N	65-27.39W	2.58
0078	47-02.98N	65-27.39W	1.11
0079	47-03.07N	65-27.18W	1.77
0080	47-03.07N	65-27.18W	7.57
0081	47-03.07N	65-27.18W	4.07
0082	47-02.60N	65-27.69W	13.76
0083	47-02.59N	65-27.72W	5.94
0084	47-02.60N	65-27.81W	6.62
0085	47-02.45N	65-27.96W	5.33
0086	47-02.43N	65-27.96W	10.63
0087	47-02.43N	65-27.96W	0.78
0088	47-02.00N	65-28.17W	84.01
0089	47-02.00N	65-28.17W	44.72
0090	47-02.00N	65-28.17W	52.44
0091	47-01.77N	65-28.52W	49.38
0092	47-01.77N	65-28.52W	51.29
0093	47-01.74N	65-28.53W	73.85
0094	47-01.64N	65-28.72W	7.28
0095	47-01.64N	65-28.72W	7.15
0096	47-01.64N	65-28.72W	7.62

VALUES = 24

MINIMUM = 0.78	MAXIMUM = 84.01	RANGE = 83.23
AVERAGE = 19.13	STD DEV = 24.96	STDERR = 5.096
VARIANCE = 623.20	SKEWNESS = 1.34	KURTOSIS = 0.33


65°29.00'W
47°03.30'N
N
MIRAMICHI
RIVER
47°01.40'N
65°27.00'W

ALDOUANE BRIDGE, New Brunswick

Samples were collected from a highway bridge located on the upper reaches of the Petite riviere Aldouane.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0097	46-42.66N	64-55.76W	45.30
0098	46-42.67N	64-55.73W	19.20
0099	46-42.67N	64-55.76W	48.40
0100	46-42.66N	64-55.79W	80.60

VALUES = 4

MINIMUM = 19.2	MAXIMUM = 80.6	RANGE = 61.4
AVERAGE = 48.36	STD DEV = 25.15	STDERR = 12.58
VARIANCE = 632.48	SKEWNESS = 0.13	KURTOSIS = -1.88

DAIGLE BRIDGE, New Brunswick

Samples were collected from a highway bridge over Daigle's Creek adjacent to the village of Little Aldouane.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0101	46-42.58N	64-53.93W	13.70
0102	46-42.58N	64-53.94W	41.80
0103	46-42.58N	64-53.94W	21.40
0104	46-42.61N	64-53.92W	48.70

VALUES = 4

MINIMUM = 13.7	MAXIMUM = 48.7	RANGE = 35.0
AVERAGE = 31.42	STD DEV = 16.55	STDERR = 8.27
VARIANCE = 273.73	SKEWNESS = -0.013	KURTOSIS = -2.30

MOONEYS CREEK, New Brunswick

Mooneys Creek is located within the town limits of Richibucto.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0105	46-41.46N	64-51.85W	21.50
0106	46-41.43N	64.51.85W	26.20

VALUES = 2

AVERAGE = 23.90 STD DEV = 3.32

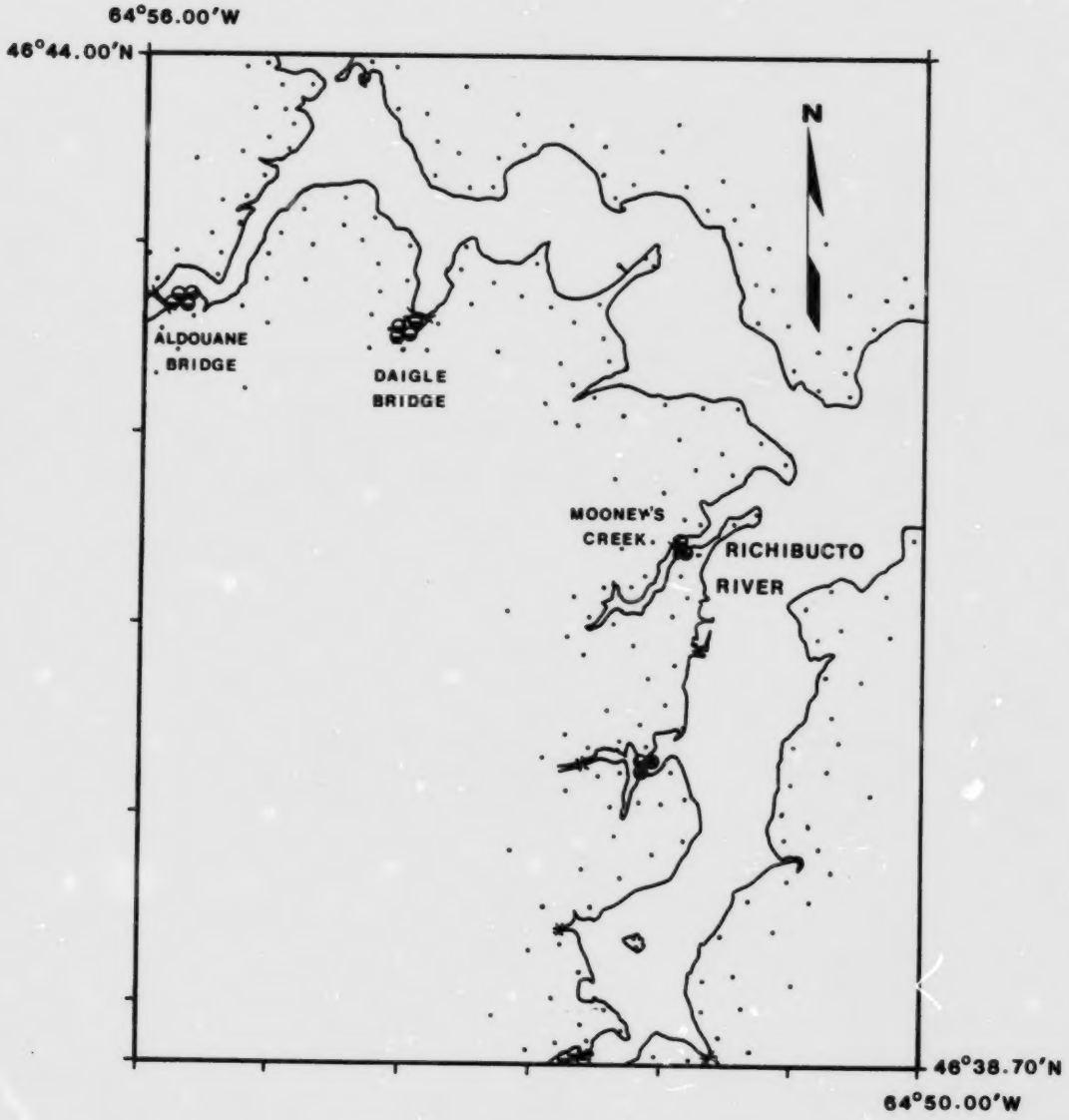
RICHIBUCTO, New Brunswick

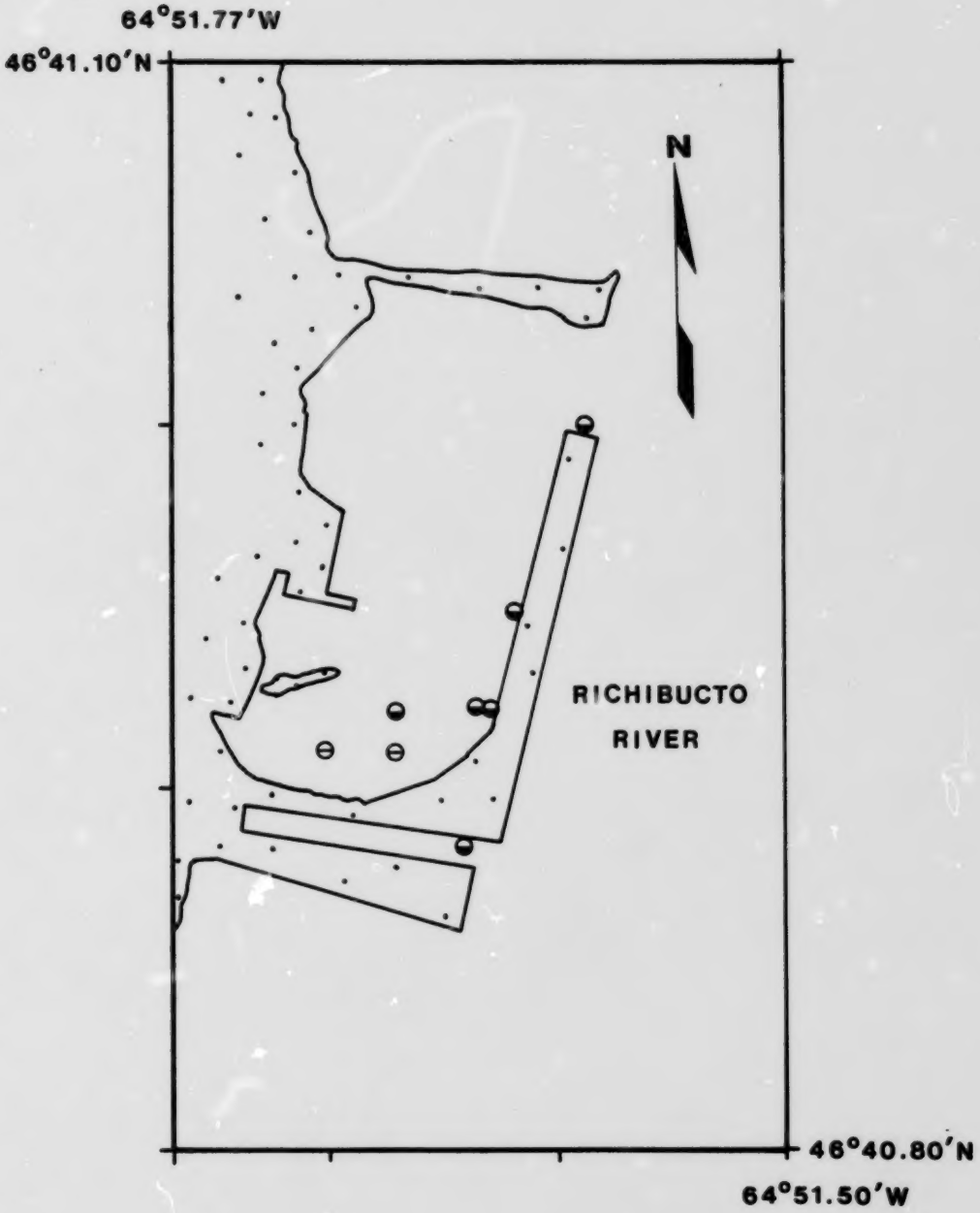
Richibucto (population 1900 in 1976), located 3.5 miles inland on the west bank of the Richibucto River supports an active fishing fleet and the Morgan' s Maritime Rum distillery. It has not been reported as a frequent dredging site although dredging has been carried out in the past. Sediments in the region are not considered to be oil contaminated.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0107	46-40.87N	64-51.65W	22.58
0108	46-40.92N	64-51.63W	58.75
0109	46-40.92N	64-51.63W	21.23
0110	46-40.95N	65-51.62W	22.92
0111	46-41.00N	64-51.60W	58.45
0112	46-40.92N	64-51.67W	14.93
0113	46-40.91N	64-51.67W	8.07
0114	46-40.91N	64-51.70W	7.06
0115	46-40.26N	64-52.11W	84.01
0116	46-40.29N	64-52.08W	62.09
0117	46-40.30N	64-52.05W	341.50
0118	46-38.77N	64-52.52W	6.74
0119	46-38.78N	64-52.56W	10.28
0120	46-38.77N	64-52.57W	40.85

VALUE = 14

MINIMUM = 6.74	MAXIMUM = 341.5	RANGE = 334.76
AVERAGE = 54.25	STD DEV = 86.31	STDERR = 23.07
VARIANCE = 7449.86	SKEWNESS = 2.57	KURTOSIS = 5.79


64°56.00'W
46°44.00'N
N
ALDOUANE
BRIDGE
DAIGLE
BRIDGE
MOONEY'S
CREEK
RICHIBUCTO
RIVER
46°38.70'N
64°50.00'W


64°51.77'W
46°41.10'N
N
RICHIBUCTO
RIVER
46°40.80'N
64°51.50'W

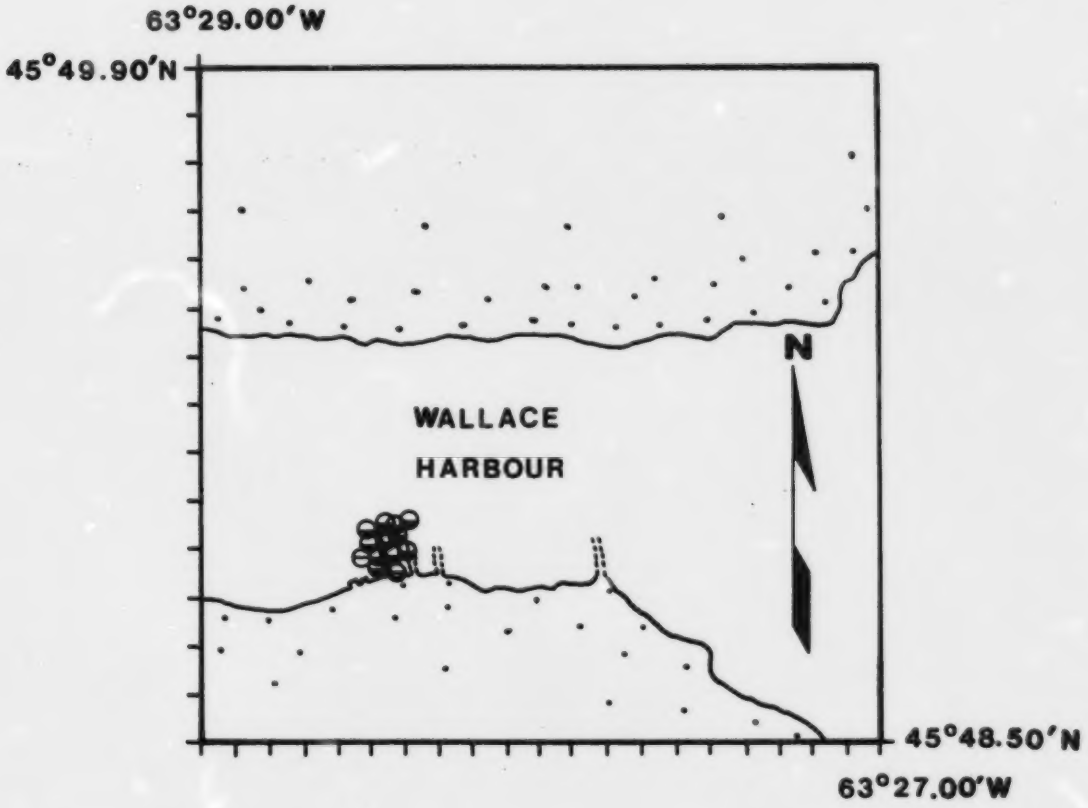
WALLACE, Nova Scotia

The population of Wallace (320 in 1976) supports fishing and marine boat repair facilities. A gravel loading area is located east of the Government warf.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0121	45-48.93N	63-28.44W	35.02
0122	45-48.93N	63-28.44W	91.97
0123	45-48.85N	63-28.46W	35.39
0124	45-48.87N	63-28.47W	15.65
0125	45-48.87N	63-28.47W	8.30
0126	45-48.90N	63-28.49W	12.57
0127	45-48.94N	63-28.51W	54.23
0128	45-48.96N	63-28.46W	79.83
0129	45-48.92N	63-28.45W	21.84
0130	45-48.88N	63-28.42W	52.79
0131	45-48.88N	63-28.42W	84.91
0132	45-48.84N	63-28.40W	5.33

VALUES = 12

MINIMUM = 5.33	MAXIMUM = 91.97	RANGE = 86.64
AVERAGE = 41.49	STD VAR = 31.0	STDERR = 8.95
VARIANCE = 961.08	SKEWNESS = 0.38	KURTOSIS = -1.51


63°29.00'W
45°49.90'N
N
WALLACE
HARBOUR
45°48.50'N
63°27.00'W

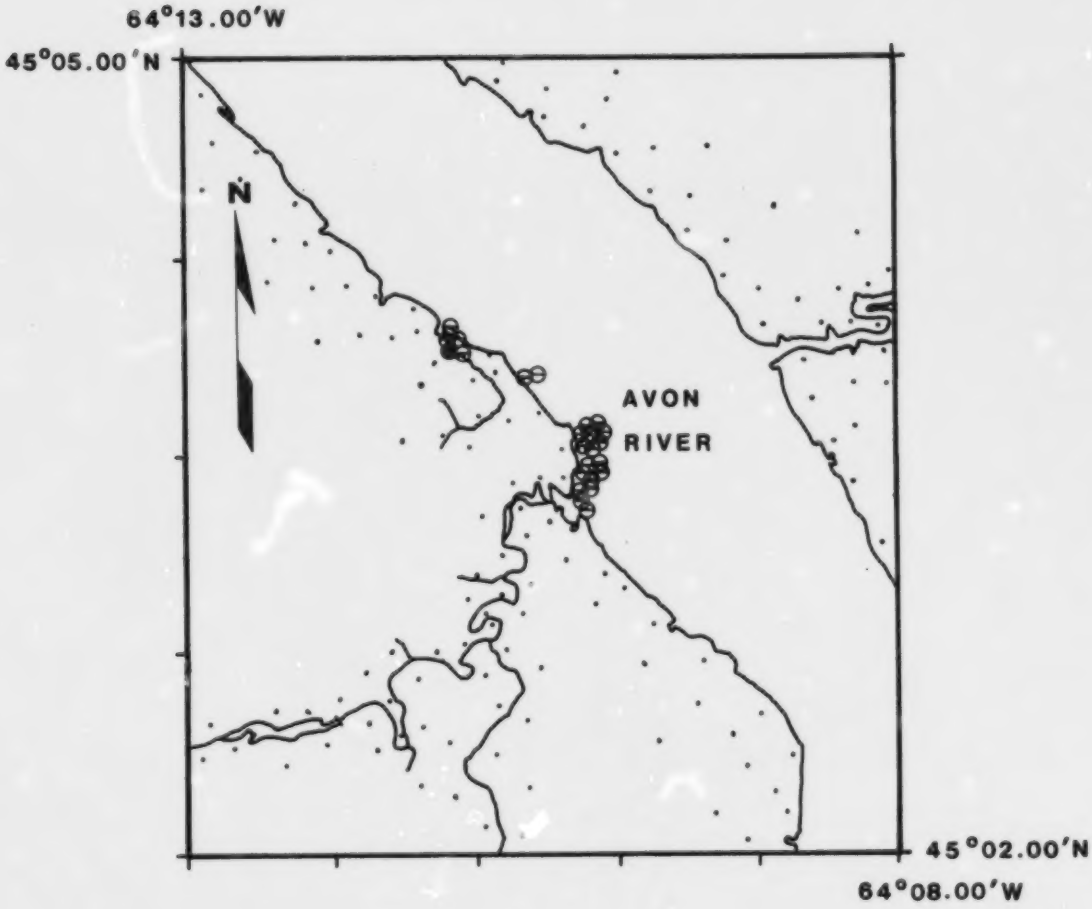
HANTSPORT, Nova Scotia

Hantsport (population 1400 in 1976) is located approximately 4 miles from the mouth of the Avon River. Although Hantsport is situated in an agricultural region, industries in the town include the Fundy Gypsum Company, Minas Basin Pulp and Power company, and Canadian Keyes Fiber Company. The tide conditions of this port are such that only sections of the channel retain water at low tide.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0133	45-03.72N	64-10.23W	2.51
0134	45-03.74N	64-10.26W	2.51
0135	45-03.80N	64-10.27W	3.30
0136	45-03.83N	64-10.22W	2.06
0137	45-03.88N	64-10.24W	1.86
0138	45-03.90N	64-10.23W	3.03
0139	45-03.94N	64-10.23W	3.56
0140	45-03.94N	64-10.20W	4.14
0141	45-03.97N	64-10.21W	2.31
0142	45-04.03N	64-10.23W	4.47
0143	45-04.04N	64-10.22W	2.66
0144	45-04.04N	64-10.22W	9.49
0145	45-04.05N	64-10.24W	2.22
0146	45-04.04N	64-10.27W	1.99
0147	45-04.06N	64-10.26W	3.10
0148	45-04.07N	64-10.26W	2.13
0149	45-04.07N	64-10.26W	2.18
0150	45-04.38N	64-10.61W	2.45
0151	45-04.38N	64-10.61W	2.27
0152	45-04.54N	64-11.12W	2.97
0153	45-04.54N	64-11.12W	1.63
0154	45-04.55N	64-11.12W	2.66
0155	45-04.55N	64-11.12W	2.74
0156	45-04.55N	64-11.12W	2.36

VALUES = 24

MINIMUM = 1.63	MAXIMUM = 9.49	RANGE = 7.96
AVERAGE = 2.94	STD DEV = 1.55	STDERR = 0.317
VARIANCE = 2.41	SKEWNESS = 3.097	KURTOSIS = 10.25


64°13.00'W
45°05.00'N
N
AVON
RIVER
45°02.00'N
64°08.00'W

MARGARETSVILLE, Nova Scotia

Margaretsville (population 190 in 1976) is one of the principal settlements on the southeast side of the Bay of Fundy. The community is mainly supported by the farming and fishing industry.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0157			1.36
0158			3.47
0159			2.35
0160			2.45
0161			0.62
0162			3.20
0163			3.74
0164			4.38
0165			1.02
0166			1.40
0167			0.77
0168			1.25
0169			1.28
0170			2.91
0171			3.74
0172			2.46
0173			1.66
0174			4.21
0175			1.60
0176			3.38
0177			3.11
0178			13.54
0179			9.47
0180			3.17

VALUES = 24

MINIMUM = 0.62	MAXIMUM = 13.54	RANGE = 12.92
AVERAGE = 3.19	STD DEV = 2.86	STDERR = 0.583
VARIANCE = 8.16	SKEWNESS = 2.30	KURTOSIS = 5.27

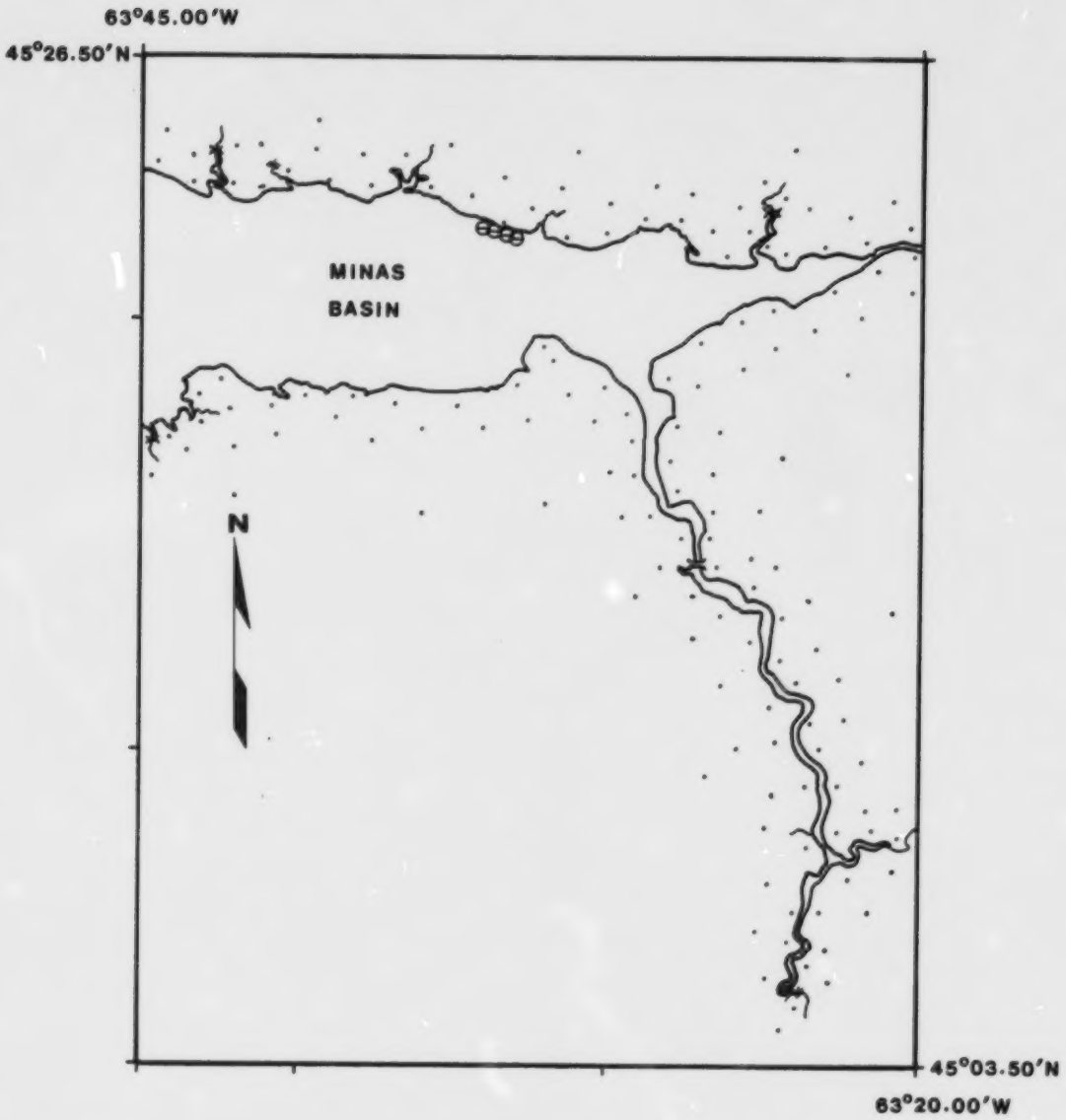
GLENHOLM - GREAT VILLAGE, Nova Scotia

Glenholm (population 398 in 1976) is situated approximately 2 miles up the Great Village River. The community has no known industries; most residents commute to Truro for employment.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0181	45-22.60N	63-33.44W	1.87
0182	45-22.60N	63-33.44W	2.97
0183	45-22.55N	63-33.42W	2.65
0184	45-22.55N	63-33.42W	2.18

VALUES = 4

MINIMUM = 1.87	MAXIMUM = 2.97	RANGE = 1.10
AVERAGE = 2.42	STD DEV = 0.49	STDERR = 0.24
VARIANCE = 0.24	SKEWNESS = 0.008	KURTOSIS = -2.17


63°45.00'W
45°26.50'N
MINAS
BASIN
N
45°03.50'N
63°20.00'W

BUCTOUCHE BRIDGE, New Brunswick

This bridge on Highway 134 spans the Buctouche River. Oil storage tanks are situated along the river banks in close proximity to the bridge. At the south end of Buctouche Bar there is a narrow dredged channel which leads through the shoals to Buctouche.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0185			10.63
0186			44.08
0187			1.07
0188			8.45

VALUES = 4

MINIMUM = 1.07	MAXIMUM = 44.08	RANGE = 43.01
AVERAGE = 16.06	STD DEV = 19.12	STDERR = 9.56
VARIANCE = 365.74	SKEWNESS = 0.65	KURTOSIS = -1.75

COCAGNE RIVER, New Brunswick

Cocagne Harbour is quite shallow and is thus only used by small craft. However, the Cocagne River is navigable for boats several miles upstream (samples were collected north of the bridge located at the mouth of the river). Industries in the Cocagne region include a fish plant and oyster fisheries.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0189			3.95
0190			2.11

VALUES = 2

AVERAGE = 3.03 STD DEV = 1.34

SHEDIAC BRIDGE, New Brunswick

Samples were collected from the highway bridge which crosses the Shediac River approximately 3 miles NNW of Shediac.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0191			4.12
0192			13.51
0193			13.93
0194			4.54
0195			2.71
0196			23.54
0197			27.28
0198			25.80

VALUES = 8

MINIMUM = 2.71	MAXIMUM = 27.28	RANGE = 24.57
AVERAGE = 14.43	STD DEV = 10.14	STDERR = 3.59
VARIANCE = 102.85	SKEWNESS = 0.08	KURTOSIS = -1.93

ABOUJAGANE RIVER, New Brunswick

Samples were collected from the river in an area located between the villages of St-Henri de-Barachois and Rabichaud.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0199			26.48
0200			4.00

VALUES = 2

AVERAGE = 15.25 STD DEV = 15.91

DUPUIS BRIDGE, New Brunswick

The bridge from which the samples were collected is located on Highway 15 near the village of Dupuis Corner.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0201			2.42
0202			1.88

VALUES = 2

AVERAGE = 2.15 STD DEV = 0.35

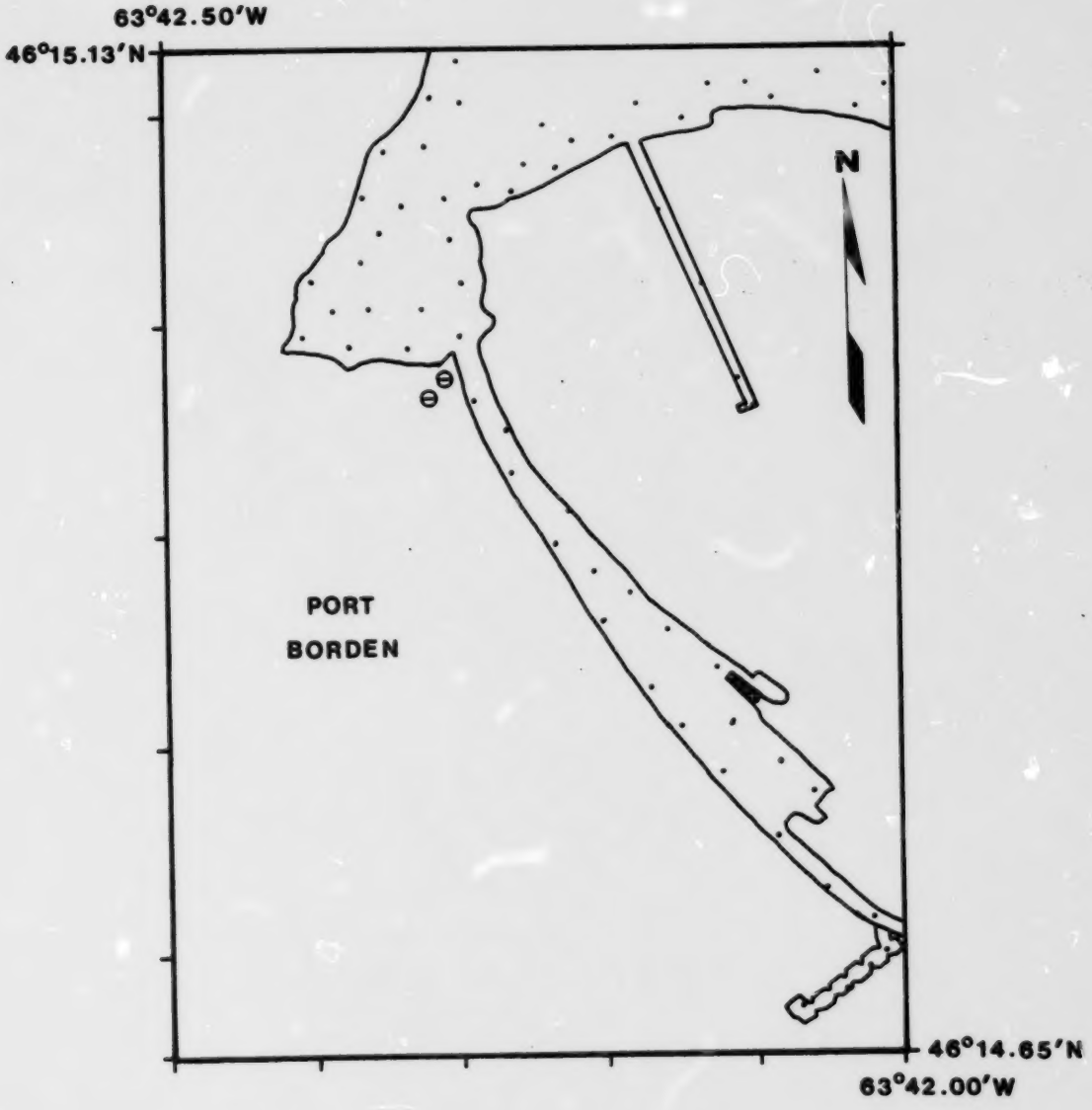
BORDEN, Prince Edward Island

The terminal for car ferry service to Cape Tormentine, New Brunswick, is located at Bordon.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0203	46-14.97N	63-42.31W	2.38
0204	46-14.96N	63-42.32W	1.83

VALUES = 2

AVERAGE = 2.11 STD DEV = 0.389


63°42.50'W
46°15.13'N
N
PORT
BORDEN
46°14.65'N
63°42.00'W

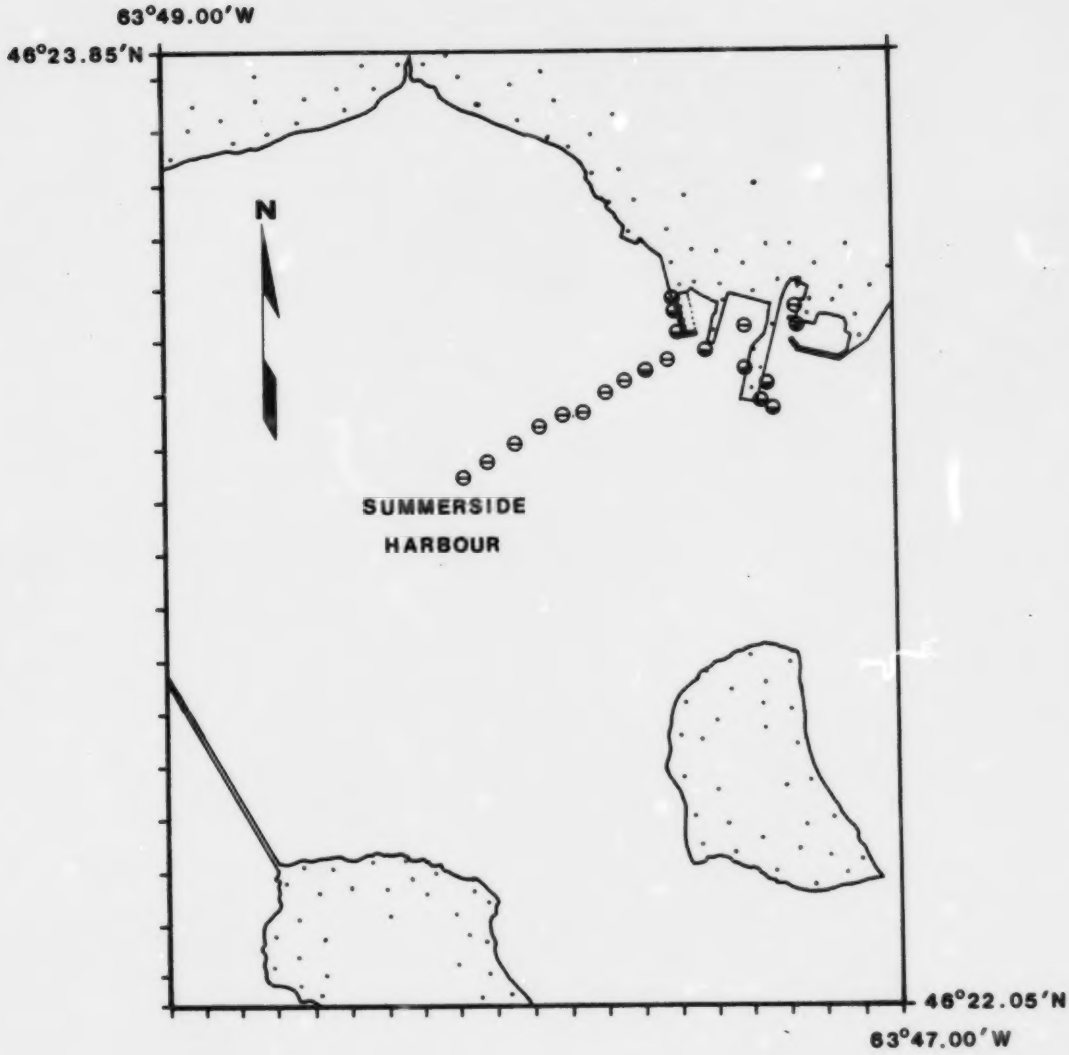
SUMMERSIDE HARBOUR, Prince Edward Island

The town of Summerside (population 8600 in 1976) located on th north side of the harbour, is a well known summer resort. Industries in the town include a woodworking plant and a beef packing and cold storage plant. The principal exports from the region are farm produce and lobster.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0205	46-23.27N	63-47.61W	9.73
0206	46-23.25N	63-47.67W	17.34
0207	46-23.23N	63-47.73W	9.53
0208	46-23.21N	63-47.78W	5.07
0209	46-23.17N	63-47.84W	5.61
0210	46-23.16N	63-47.90W	5.02
0211	46-23.14N	63-47.96W	4.08
0212	46-23.11N	63-48.03W	3.76
0213	46-23.08N	63-48.10W	3.39
0214	46-23.05N	63-48.17W	3.29
0215	46-23.32N	63-47.57W	74.85
0216	46-23.35N	63-47.57W	37.42
0217	46-23.37N	63-47.57W	45.05
0218	46-23.28N	63-47.51W	31.74
0219	46-23.33N	63-47.40W	8.95
0220	46-23.24N	63-47.40W	13.66
0221	46-23.19N	63-47.36W	26.63
0222	46-23.22N	63-47.35W	16.11
0223	46-23.18N	63-47.33W	18.56
0224	46-23.34N	63-47.26W	22.44
0225	46-23.37N	63-47.27W	2.29

VALUES = 21

MINIMUM = 3.29	MAXIMUM = 74.90	RANGE = 71.61
AVERAGE = 17.36	STD DEV = 17.92	STDERR = 3.91
VARIANCE = 321.13	SKEWNESS = 1.68	KURTOSIS = 2.54


63°49.00'W
46°23.85'N
N
SUMMERSIDE
HARBOUR
46°22.05'N
63°47.00'W

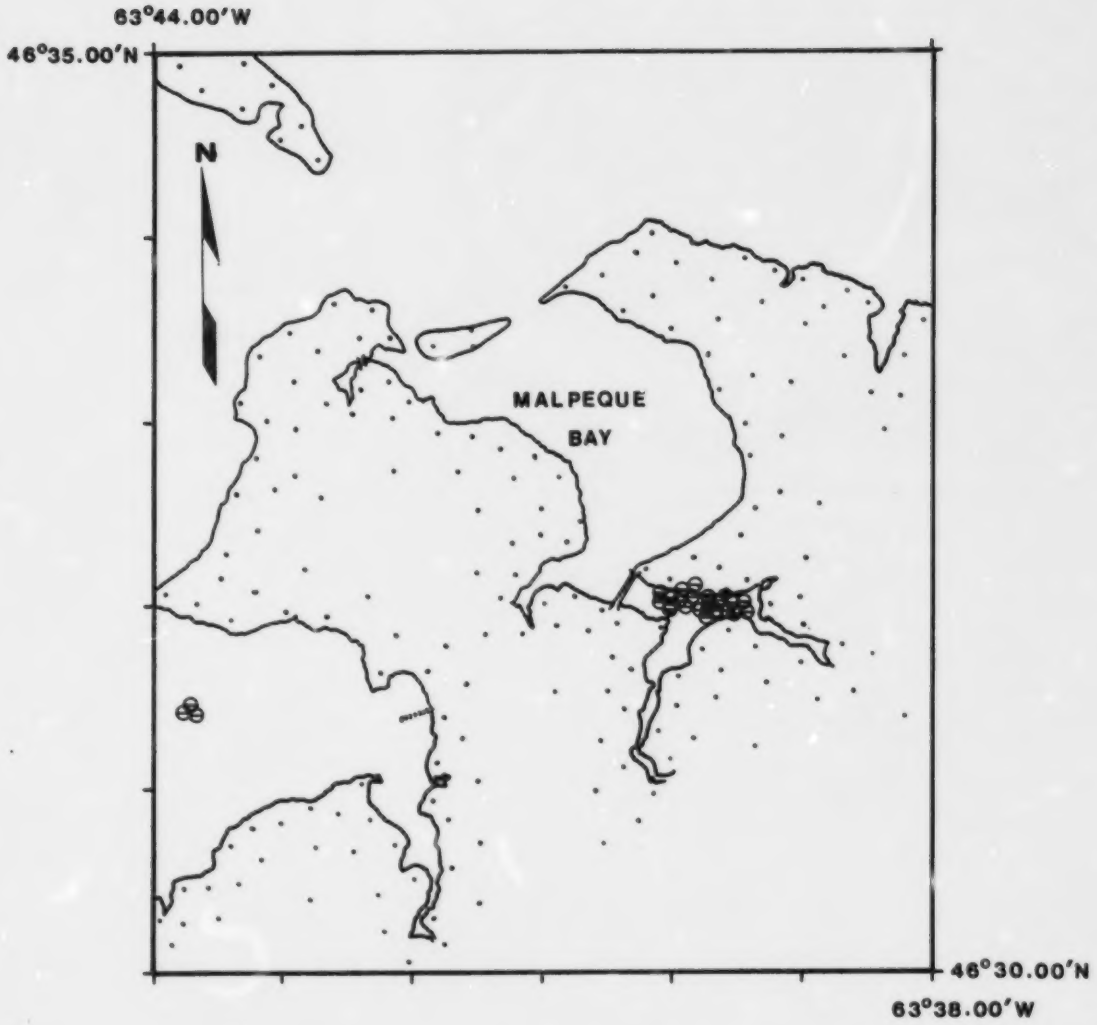
MALPEQUE, Prince Edward Island

Malpeque (population 178 in 1976) situated on the neck of land between Darnley Basin and March Water, is one of the oldest settlements on the island. A fish plant is the only commercial venture in the area. Marine sediments from Malpeque have been reported to be oil contaminated, with concentrations as high as 1400 ppm. Sediments in the region are predominantly sand/silt.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0226	46-31.42N	63-43.75W	1.99
0227	46-31.42N	63-43.75W	1.11
0228	46-31.42N	63-43.75W	1.77
0229	46-32.05N	63-39.90W	4.68
0230	46-32.01N	63-39.81W	2.86
0231	46-32.01N	63-39.68W	6.27
0232	46-31.99N	63-39.61W	1.51
0233	46-32.02N	63-39.59W	2.70
0234	46-31.98N	63-39.57W	6.70
0235	46-31.98N	63-39.49W	5.58
0236	46-32.03N	63-39.65W	4.12
0237	46-32.03N	63-39.70W	1.07
0238	46-32.03N	63-39.76W	1.63
0239	46-32.04N	63-39.80W	1.07
0240	46-32.04N	63-39.87W	4.68
0241	46-32.06N	63-39.89W	1.77
0242	46-32.06N	63-39.89W	3.13
0243	46-32.06N	63-39.89W	2.48
0244	46-32.05N	63-39.91W	9.56
0245	46-32.05N	63-39.92W	48.42
0246	46-32.05N	63-39.92W	35.73
0247	46-32.05N	63-39.93W	9.56
0248	46-32.06N	63-39.93W	8.04

VALUES = 23

MINIMUM = 1.07	MAXIMUM = 48.42	RANGE = 47.35
AVERAGE = 7.24	STD DEV = 11.46	STDERR = 2.39
VARIANCE = 131.39	SKEWNESS = 2.63	KURTOSIS = 5.93


63°44.00'W
46°35.00'N
N
MALPEQUE
BAY
46°30.00'N
63°38.00'W

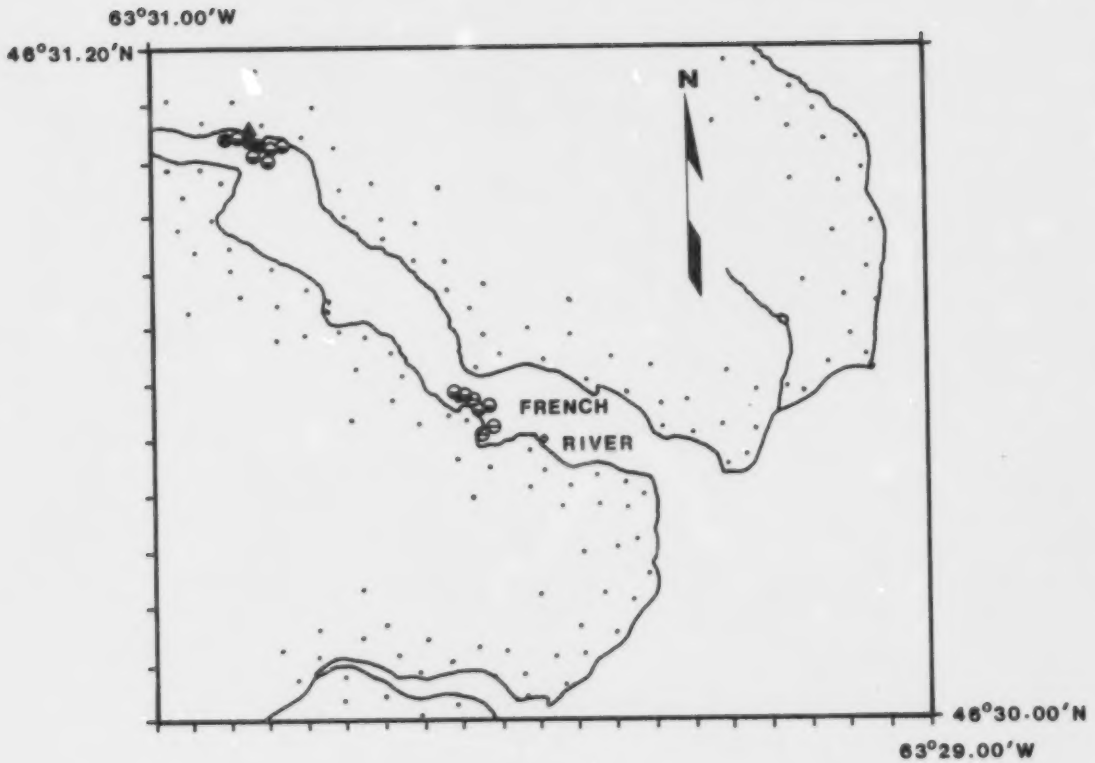
FRENCH RIVER, Prince Edward Island

This community has a small population supported principally by fishing. The French River wharf is located 1 mile above the rivermouth. This locality is reported to be a frequent dredging site, with oil concentrations in the sediments reaching 2000 ppm. Sediments are are reported to be predominantly sand/silt in nature.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0249	46-31.05N	63-30.77W	23.48
0250	46-31.05N	63-30.77W	1145.00
0251	46-31.05N	63-30.77W	542.50
0252	46-31.04N	63-30.74W	322.00
0253	46-31.04N	63-30.72W	66.42
0254	46-31.04N	63-30.72W	11.39
0255	46-31.03N	63-30.72W	66.42
0256	46-31.03N	63-30.72W	50.83
0257	46-31.02N	63-30.71W	72.16
0258	46-30.57N	63-30.19W	27.36
0259	43-30.57N	63-30.19W	69.12
0260	46-30.56N	63-30.18W	4.91
0261	46-30.55N	63-30.16W	13.80
0262	46-30.55N	63-30.16W	41.17
0263	46-30.52N	63-30.16W	7.44
0264	46-30.53N	63-30.14W	3.14

VALUES = 16

MINIMUM = 3.14	MAXIMUM = 1145	RANGE = 1141.86
AVERAGE = 154.20	STD DEV = 300.38	STDERR = 75.09
VARIANCE = 90225.8	SKEWNESS = 2.33	KURTOSIS = 4.61


63°31.00'W
46°31.20'N
N
FRENCH
RIVER
46°30.00'N
63°29.00'W

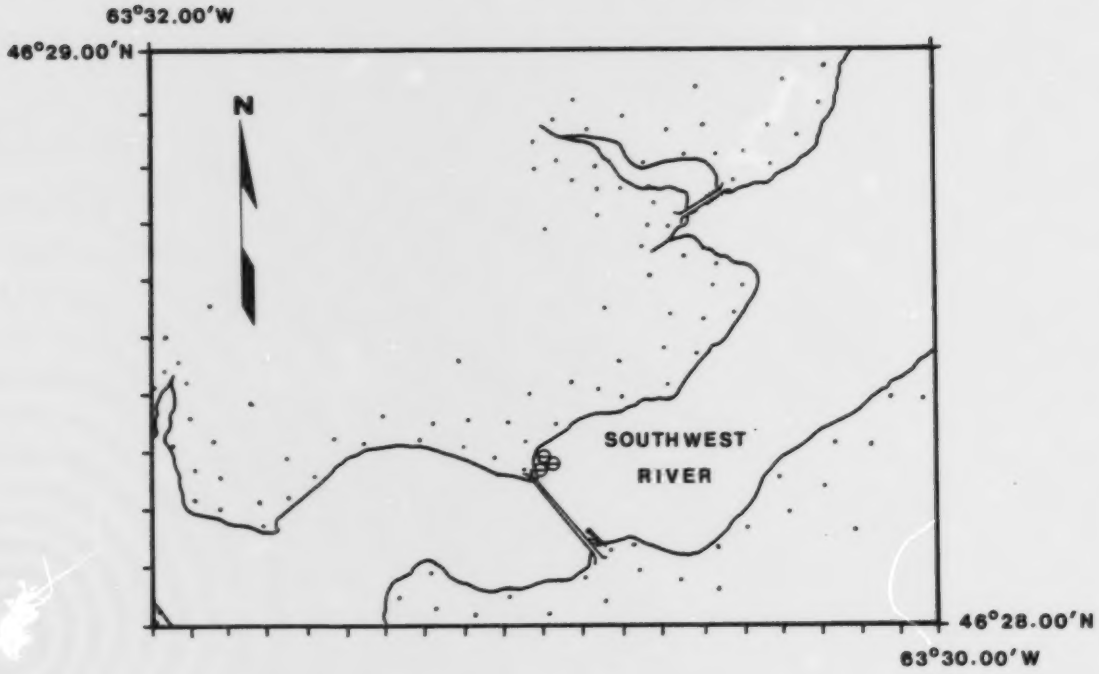
NEW LONDON BRIDGE, Prince Edward Island

The community of New London (population 138 in 1976) is located 2 miles above the mouth of the Southwest River at New London Bay.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0265	46-28.27N	63-31.01W	1.21
0266	46-28.29N	63-31.00W	1.24
0267	46-28.28N	63-30.98W	1.77

VALUES = 3

MINIMUM = 1.21	MAXIMUM = 1.77	RANGE = 0.56
AVERAGE = 1.41	STD DEV = 0.32	STDERR = 0.18
VARIANCE = 0.099	SKEWNESS = 0.38	KURTOSIS = -2.33


63°32.00'W
46°29.00'N
N
SOUTHWEST
RIVER
46°28.00'N
63°30.00'W

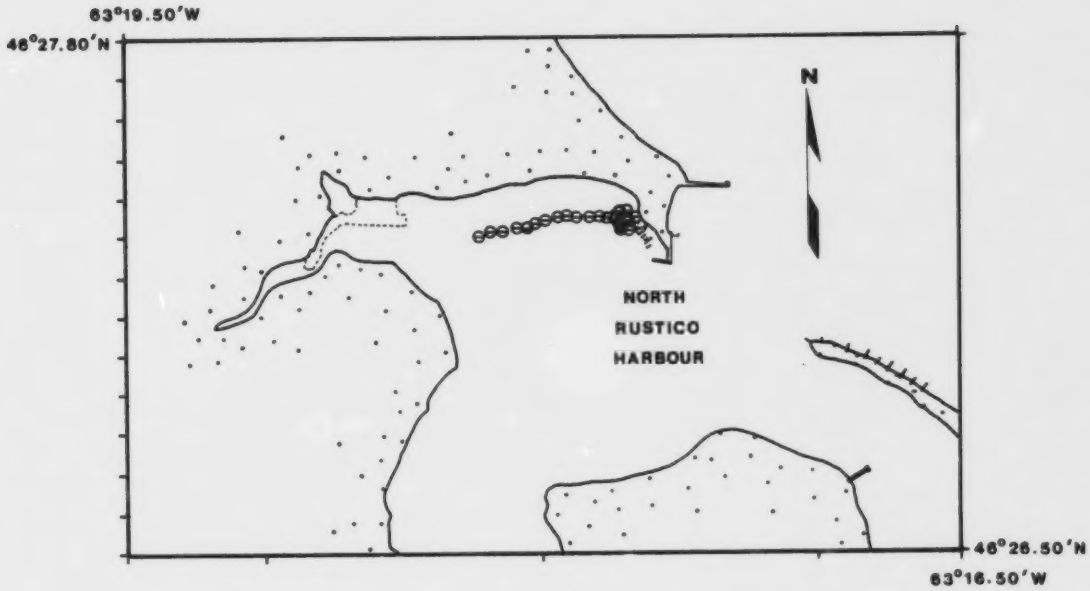
NORTH RUSTICO, Prince Edward Island

Fishing is the major industry of this community which is considered to have reasonable marine traffic. Sediments from this port are considered to be contaminated by oil (170 to 1900 ppm) by EPS. The sediment is composed mostly of sand. Sample collection during the present study was restricted by ice cover and outboard motor failure.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0268	46-27.30N	63-18.22W	2.52
0269	46-27.31N	63-18.18W	3.49
0270	46-27.31N	63-18.14W	2.93
0271	46-27.32N	63-18.10W	2.86
0272	46-27.32N	63-18.06W	11.58
0273	46-27.33N	63-18.03W	1.44
0274	46-27.34N	63-17.99W	2.63
0275	46-27.35N	63-17.94W	2.56
0276	46-27.35N	63-17.90W	2.93
0277	46-27.35N	63-17.87W	2.25
0278	46-27.35N	63-17.83W	2.46
0279	46-27.35N	63-17.79W	2.43
0280	46-27.35N	63-17.76W	3.69
0281	46-27.34N	63-17.73W	2.46
0282	46-27.35N	63-17.74W	15.40
0283	46-27.33N	63-17.72W	14.96
0284	46-27.32N	63-17.69W	2.29
0285	46-27.36N	63-17.73W	13.90
0286	46-27.37N	63-17.72W	13.18
0287	46-27.34N	63-17.69W	5.24
0288	46-27.35N	63-17.68W	3.49

VALUES = 21

MINIMUM = 1.44	MAXIMUM = 15.40	RANGE = 13.96
AVERAGE = 5.46	STD DEV = 4.88	STDERR = 1.07
VARIANCE = 23.83	SKEWNESS = 1.14	KURTOSIS = -0.57


63°19.50'W
46°27.80'N
N
NORTH
RUSTICO
HARBOUR
46°26.50'N
63°16.50'W

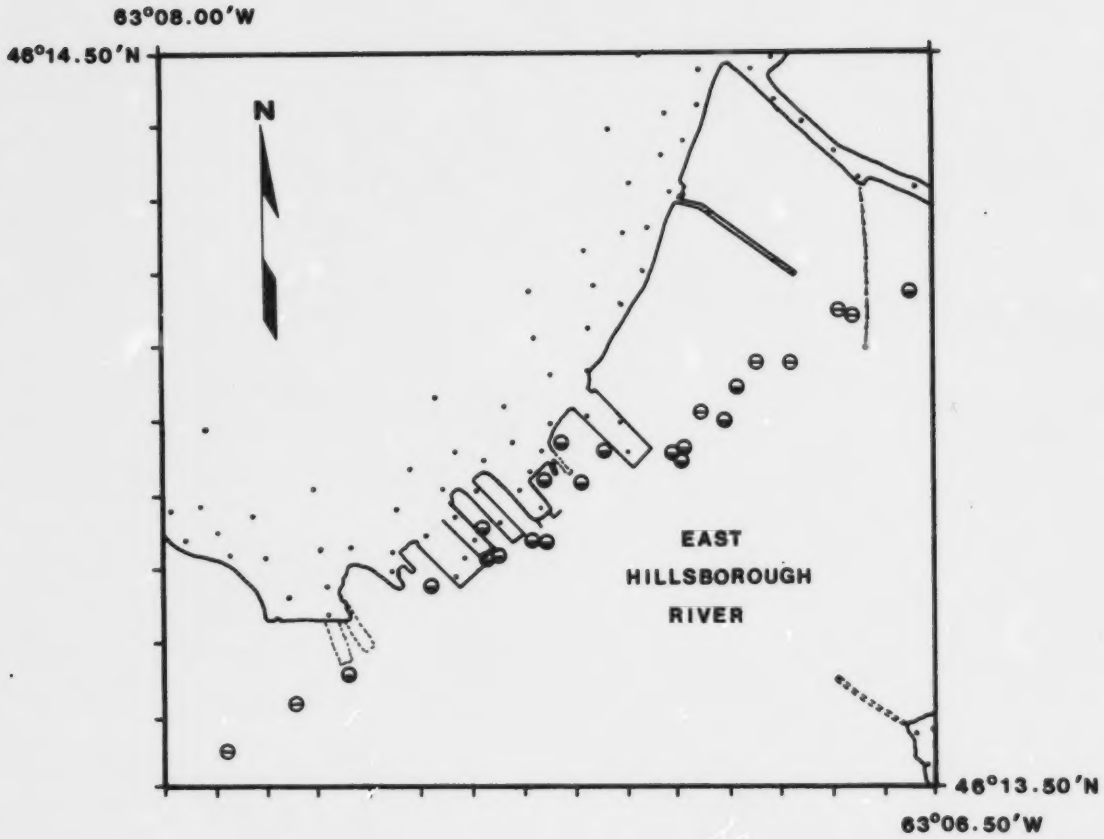
CHARLOTTETOWN, Prince Edward Island

Charlottetown (population 17000 in 1976) located on the west bank of the Hillsborough River, has a high number of commercial/residential developments. The harbour supports a potato handling wharf, oil off-loading facilities, and a minor amount of fishing and small boat traffic. Sediments are reported to be primarily sand/silt in nature and not oil contaminated.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0289	46-14.17N	63-06.54W	12.12
0290	46-14.14N	63-06.65W	4.40
0291	46-14.15N	63-06.68W	4.43
0292	46-14.08N	63-06.77W	4.68
0293	46-14.08N	63-06.84W	5.75
0294	46-14.04N	63-06.88W	20.20
0295	46-14.01N	63-06.95W	7.82
0296	46-13.97N	63-07.00W	18.44
0297	46-13.97N	63-07.00W	11.01
0298	46-13.97N	63-07.00W	12.20
0299	46-14.00N	63-07.09W	18.45
0300	46-13.96N	63-07.14W	18.61
0301	46-13.91N	63-07.18W	14.66
0302	46-13.97N	63-07.22W	24.76
0303	46-13.92N	63-07.26W	10.83
0304	46-13.84N	63-07.27W	16.47
0305	46-13.84N	63-07.29W	70.90
0306	46-13.86N	63-07.38W	26.65
0307	46-13.82N	63-07.37W	39.31
0308	46-13.82N	63-07.37W	40.62
0309	46-13.78N	63-07.46W	10.36
0310	46-13.66N	63-07.64W	13.06
0311	46-13.62N	63-07.74W	7.80
0312	46-13.55N	63-07.88W	3.78

VALUES = 24

MINIMUM = 3.78	MAXIMUM = 70.90	RANGE = 67.12
AVERAGE = 17.39	STD DEV = 15.11	STDERR = 3.09
VARIANCE = 228.37	SKEWNESS = 1.98	KURTOSIS = 4.10


63°08.00'W
46°14.50'N
N
EAST
HILLSBOROUGH
RIVER
46°13.50'N
63°06.50'W

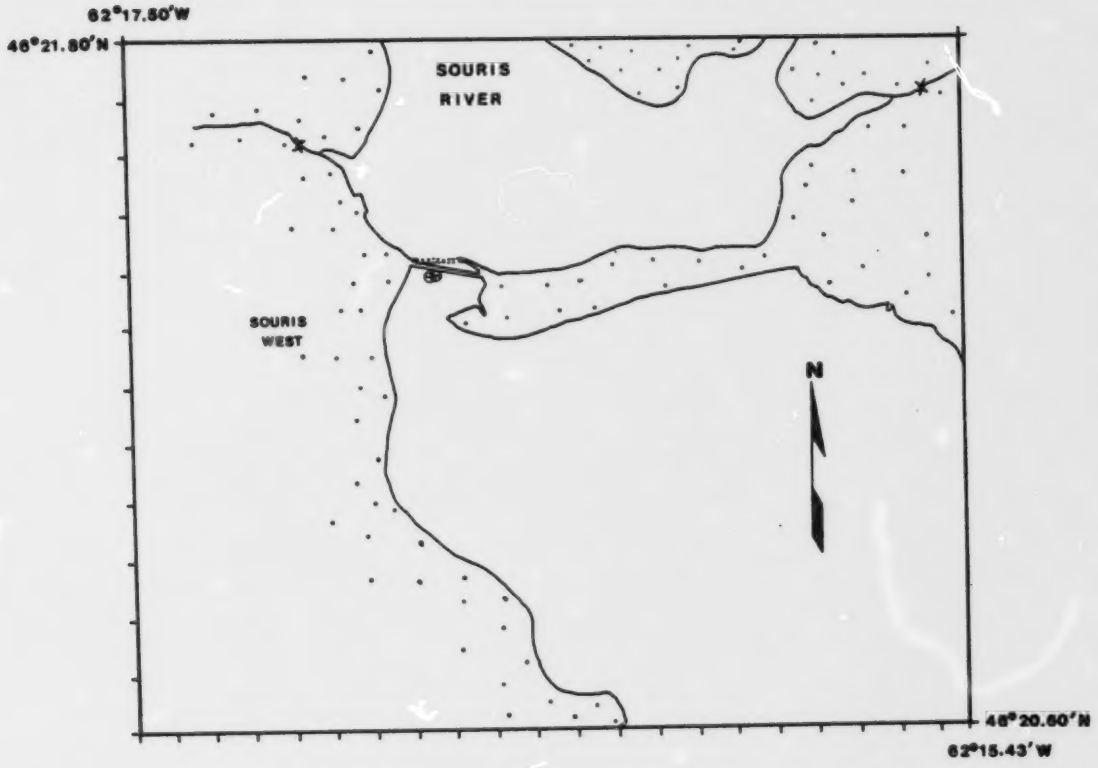
SOURIS RIVER BRIDGE, Prince Edward Island

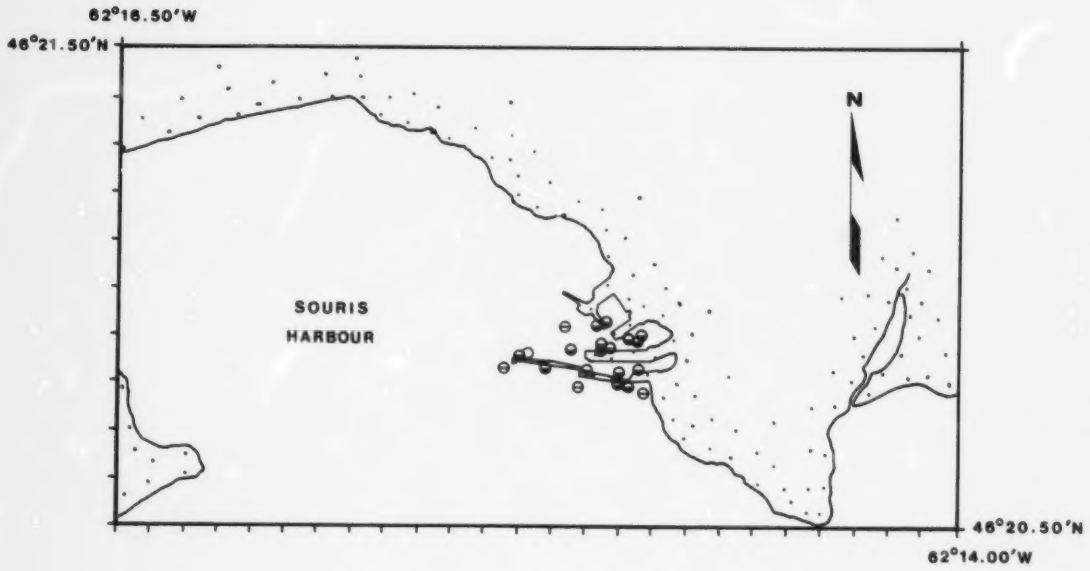
Souris (population 1447 in 1976) is a major port in Prince Edward Island as well a center of the farming district. Located at Souris Landing are Irving and Imperial Oil facilities, railroad yards, and Eastern Fisheries. Marine fisheries traffic in the harbour includes both small lobster boats and draggers. The ferry to the Magdalen Islands docks in the harbour. The harbour is not frequently dredged. Oil contaminated sand/silt sediments (up to 3500 ppm) in the region have been reported by EPS.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0313	46-21.39N	62-16.75W	4.76
0314	46-21.39N	62-16.74W	3.49
0315	46-20.79N	62-14.94W	2.01
0316	46-20.80N	62-15.13W	2.19
0317	46-20.84N	62-15.35W	3.17
0318	46-20.86N	62-15.30W	0.34
0319	46-20.86N	62-15.30W	9.50
0320	46-20.84N	62-15.22W	27.51
0321	46-20.83N	62-15.11W	36.59
0322	46-20.81N	62-15.00W	37.03
0323	46-20.81N	62-15.00W	37.03
0324	46-20.84N	62-14.95W	54.71
0325	46-20.83N	62-15.01W	46.30
0326	46-20.94N	62-15.15W	9.56
0327	46-20.87N	62-15.13W	22.47
0328	46-20.87N	62-15.05W	14.51
0329	46-20.87N	62-15.05W	53.31
0330	46-20.90N	62-14.92W	22.98
0331	46-20.89N	62-14.96W	18.59
0332	46-20.89N	62-14.96W	17.38
0333	46-20.88N	62-15.05W	31.10
0334	46-20.94N	62-15.06W	51.94
0335	46-20.95N	62-15.04W	33.97
0336			55.22

VALUES = 24

MINIMUM = 0.34	MAXIMUM = 55.20	RANGE = 54.86
AVERAGE = 24.82	STD DEV = 18.68	STDERR = 3.81
VARIANCE = 349.04	SKEWNESS = 0.25	KURTOSIS = -1.38


62°17.60'W
46°21.80'N
SOURIS
RIVER
SOURIS
WEST
N
46°20.60'N
62°15.43'W


62°16.50'W
46°21.50'N
N
SOURIS
HARBOUR
46°20.50'N
62°14.00'W

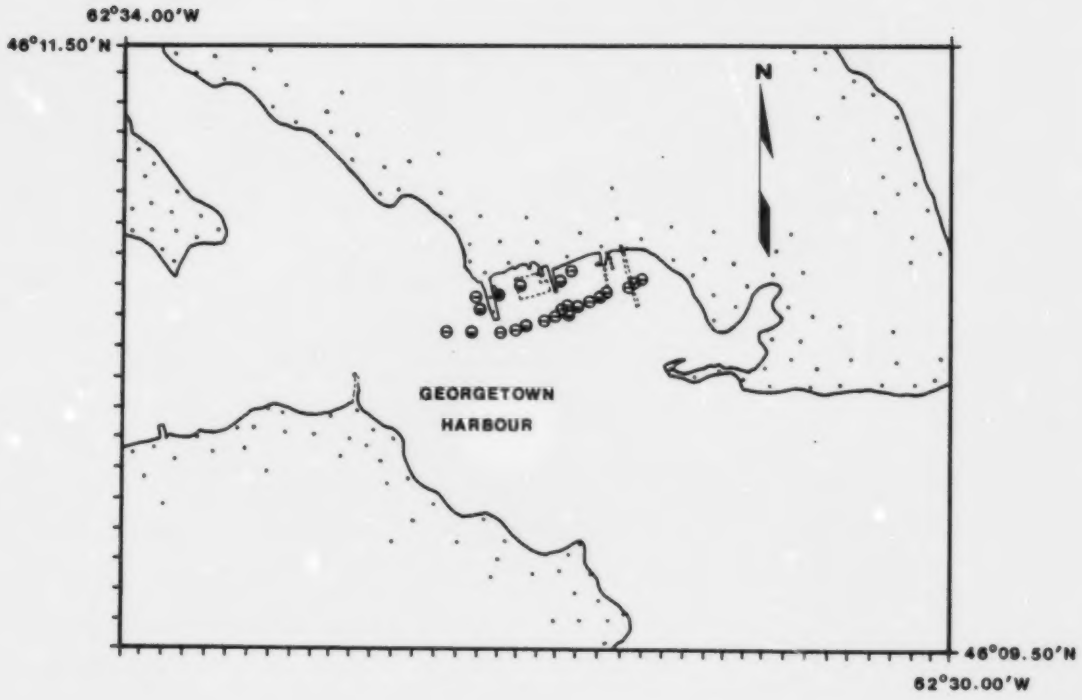
GEORGETOWN, Prince Edward Island

Georgetown (population 730 in 1976) is an active port with railroad and marine slip facilities. Farm produce and pulpwood are exported from this port which also supports the Nickerson fish processing plant. The sediments in the harbour (mainly sand and silt) are reported by EPS to be uncontaminated by oil.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0337	46-10.73N	62-31.50W	1.86
0338	46-10.72N	62-31.53W	6.78
0339	46-10.71N	62-31.59W	2.65
0340	46-10.69N	62-31.64W	5.12
0341	46-10.68N	62-31.70W	19.83
0342	46-10.66N	62-31.75W	5.67
0343	46-10.65N	62-31.81W	15.61
0344	46-10.64N	62-31.86W	8.61
0345	46-10.64N	62-31.86W	18.31
0346	46-10.64N	62-31.86W	6.64
0347	46-10.62N	62-31.91W	9.51
0348	46-10.60N	62-31.97W	9.98
0349	46-10.58N	62-32.05W	10.82
0350	46-10.57N	62-32.10W	9.64
0351	46-10.56N	62-32.16W	3.97
0352	46-10.56N	62-32.29W	13.78
0353	46-10.56N	62-32.43W	4.30
0354	46-10.67N	62-32.30W	8.06
0355	46-10.63N	62-32.28W	11.63
0356	46-10.68N	62-32.19W	740.00
0357	46-10.71N	62-32.08W	16.57
0358	46-10.72N	62-31.90W	24.34
0359	46-10.76N	62-31.87W	1.87

VALUES = 23

MINIMUM = 1.86	MAXIMUM = 740.0	RANGE = 738.14
AVERAGE = 41.55	STD DEV = 152.38	STDERR = 31.77
VARIANCE = 23218.2	SKEWNESS = 4.18	KURTOSIS = 16.20


62°34.00'W
46°11.50'N
N
GEORGETOWN
HARBOUR
46°09.50'N
62°30.00'W

WOOD ISLANDS, Prince Edward Island

The Wood Islands are separated by a dredged channel leading to the ferry terminal. The primary industries of the area are tourism and fishing. The sediments in this locality (gravel/sand/silt) are reported to be contaminated by oil (41 to 1920 ppm). This area is a frequent dredging site.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0360			3.66
0361			7.71
0362			7.99
0363			11.63
0364			2.39
0365			1.10
0366			1.43
0367			5.65
0368			7.74
0369			10.29
0370			32.18
0371			555.00
0372			12.86

VALUES = 13

MINIMUM = 1.10	MAXIMUM = 555.0	RANGE = 553.90
AVERAGE = 50.74	STD DEV = 151.72	STDERR = 42.08
VARIANCE = 23019.5	SKEWNESS = 2.80	KURTOSIS = 6.39

PICTOU, Nova Scotia

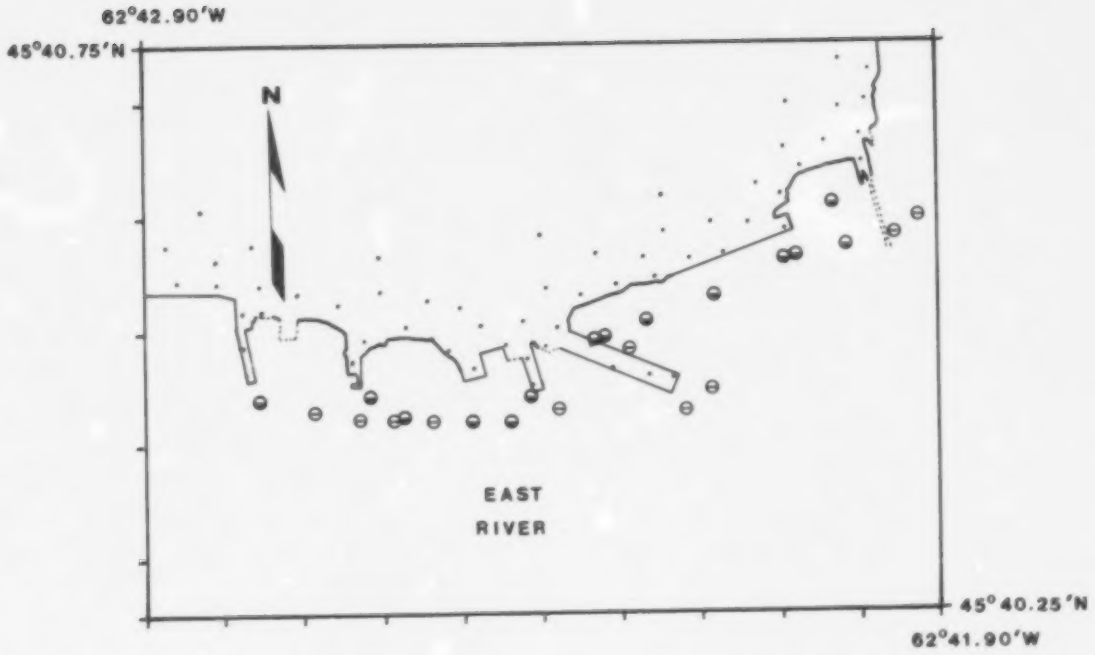
Pictou (population 4600 in 1976) is situated on the north shore of the harbour. The town is a highly developed community with several industries including National Sea Products, Fergusson Industries, Scott Maritime Pulp, and Maritime Packers. The fish plant is quite sizeable and employes ca. 500.

The port is not a frequent dredging site and has not reported to be oil contaminated.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0373	45-40.44N	62-42.76W	15.87
0374	45-40.43N	62-42.69W	6.93
0375	45-40.42N	62-42.63W	9.23
0376	45-40.42N	62-42.58W	9.25
0377	45-40.42N	62-42.58W	23.85
0378	45-40.42N	62-42.54W	9.59
0379	45-40.42N	62-42.49W	11.67
0380	45-40.42N	62-42.44W	10.86
0381	45-40.43N	62-42.38W	6.83
0382	45-40.43N	62-42.22W	8.68
0383	45-40.45N	62-42.19W	5.11
0384	45-40.49N	62-42.33W	20.75
0385	45-40.49N	62-42.33W	51.74
0386	45-40.51N	62-42.27W	16.58
0387	45-40.53N	62-42.18W	32.87
0388	45-40.56N	62-42.09W	18.12
0389	45-40.56N	62-42.09W	15.72
0390	45-40.57N	62-42.02W	13.68
0391	45-40.58N	62-41.96W	5.57
0392	45-40.60N	62-41.93W	5.81
0393	45-40.61N	62-42.04W	27.86
0394	45-40.48N	62-42.29W	5.54
0395	45-40.44N	62-42.42W	15.25
0396	45-40.44N	62-42.62W	24.64

VALUES = 24

MINIMUM = 5.11	MAXIMUM = 51.74	RANGE = 46.63
AVERAGE = 15.33	STD DEV = 10.75	STDERR = 2.195
VARIANCE = 115.63	SKEWNESS = 1.67	KURTOSIS = 2.99


62°42.90'W
45°40.75'N
N
EAST
RIVER
45°40.25'N
62°41.90'W

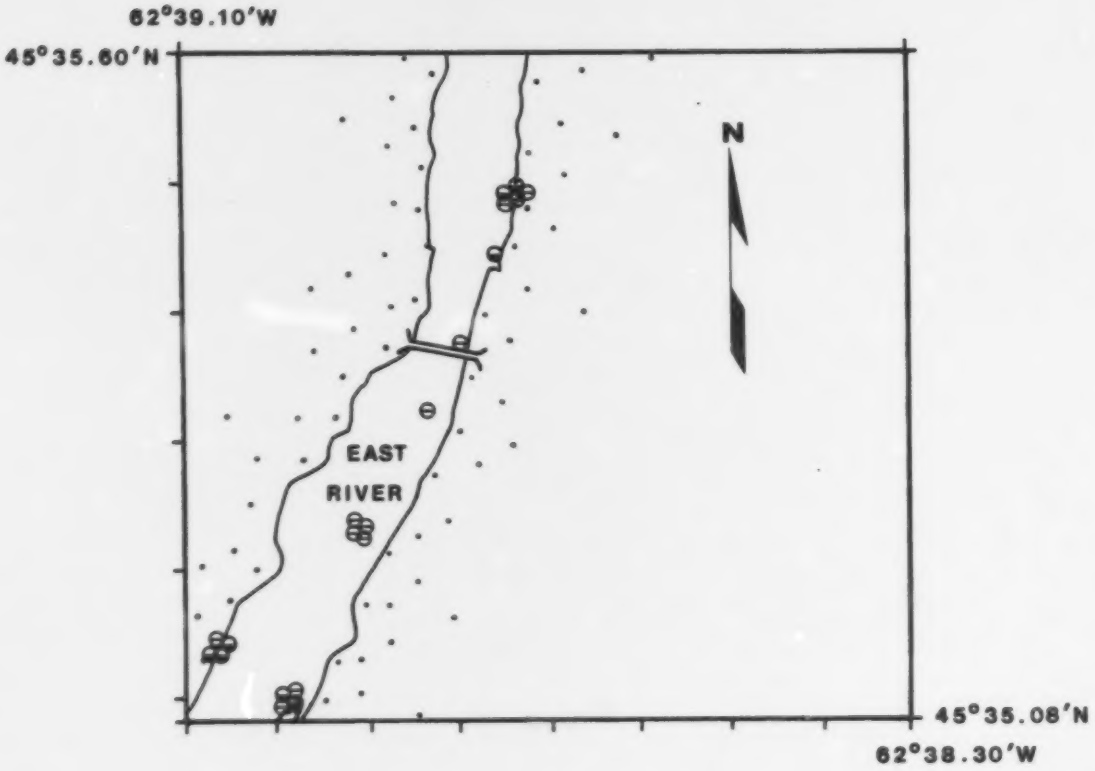
NEW GLASGOW, Nova Scotia

A channel has been dredged from the mouth of the East River to New Glasgow (6.5 miles). New Glasgow (population 10700 in 1976) is situated in an area of high industrial development which includes several factories, canneries and a foundry. The industry in this area does not include oil refineries or fish plants.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0397	45-35.32N	62-38.85W	6.19
0398	45-35.37N	62-38.81W	3.25
0399	45-35.44N	62-38.78W	18.93
0400	45-35.49N	62-38.76W	15.59
0401	45-35.49N	62-38.76W	9.49
0402	45-35.49N	62-38.76W	10.12
0403	45-35.49N	62-38.76W	7.89
0404	45-35.49N	62-38.76W	9.17
0405	45-35.23N	62-38.93W	9.20
0406	45-35.23N	62-38.93W	9.33
0407	45-35.23N	62-38.93W	7.44
0408	45-35.23N	62-38.93W	7.78
0409	45-35.10N	62-38.98W	11.99
0410	45-35.10N	62-38.98W	1.04
0411	45-35.10N	62-38.98W	4.48
0412	45-35.10N	62-38.98W	19.13
0413	45-35.14N	62-39.07W	3.99
0414	45-35.14N	62-39.07W	26.14
0415	45-35.13N	62-39.07W	18.29
0416	45-35.13N	62-39.07W	13.35

VALUES = 20

MINIMUM = 1.04	MAXIMUM = 26.10	RANGE = 25.06
AVERAGE = 10.64	STD DEV = 6.306	STDERR = 1.41
VARIANCE = 39.76	SKEWNESS = 0.699	KURTOSIS = -0.24


62°39.10'W
45°35.60'N
N
EAST
RIVER
45°35.08'N
62°38.30'W

LISMORE, Nova Scotia

This site (population less than 500) may show the effects of a fish processing plant on " oil " measurements, since such a facility (H.F. Russel Sea Foods) is the only industry in the immediate area. There is no history of dredging in the immediate area.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0417			25.01
0418			40.36
0419			17.05
0420			24.66
0421			3.83
0422			2.37
0423			8.11
0424			4.44
0425			7.86
0426			3.89
0427			13.97
0428			2.38
0429			1.34
0430			0.45
0431			1.58
0432			1.95

VALUES = 16

MINIMUM = 0.45	MAXIMUM = 40.40	RANGE = 39.95
AVERAGE = 9.95	STD DEV = 11.43	STDERR = 2.86
VARIANCE = 130.67	SKEWNESS = 1.298	KURTOSIS = 0.62

ARISAIG, Nova Scotia

Arisaig is a small boat harbour located on the shore of Northumberland Strait near Malignant Cove.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0433			0.34
0434			1.00
0435			2.09
0436			2.08
0437			1.91
0438			0.78
0439			3.33
0440			71.80

VALUES = 8

MINIMUM = 0.34	MAXIMUM = 71.80	RANGE = 71.46
AVERAGE = 10.42	STD DEV = 24.82	STDERR = 8.78
VARIANCE = 616.06	SKEWNESS = 1.85	KURTOSIS = 1.69

MALIGNANT COVE, Nova Scotia

Malignant Cove located 10 miles SW of Cape George, was chosen to provide a comparison with Lismore, as an aid in interpreting low background levels. The region has a population of less than 100 residents and is situated in close proximity to Lismore.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0441			3.49
0442			1.70
0443			1.79
0444			0.56
0445			1.60
0446			2.13
0447			0.67

VALUES = 7

MINIMUM = 0.56	MAXIMUM = 3.49	RANGE = 2.93
AVERAGE = 1.71	STD DEV = 0.98	STDERR = 0.37
VARIANCE = 0.96	SKEWNESS = 0.48	KURTOSIS = -0.98

PORT HAWKESBURY, Nova Scotia

Port Hawkesbury (population 4000 in 1976) is situated on the east shore of the strait of Canso, Cape Breton Island. Nova Scotia Pulp Co., Pacific George Corp., and Gulf Oil Canada Ltd., have established marine facilities just outside of Port Hawkesbury. Extensive dredging has been performed in the vicinity of the Canso Lock and the sediments have not been reported to be oil contaminated.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0448	45-36.73N	61-22.22W	10.03
0449	45-36.71N	61-22.15W	26.35
0450	45-36.71N	61-22.15W	42.25
0451	45-36.69N	61-22.08W	27.54
0452	45-36.66N	61-22.00W	19.97
0453	45-36.63N	61-22.94W	27.72
0454	45-36.60N	61-21.86W	21.23
0455	45-36.57N	61-21.78W	46.30
0456	45-36.55N	61-21.71W	45.50
0457	45-36.53N	61-21.65W	33.37
0458	45-36.50N	61-21.58W	22.50
0459	45-36.48N	61-21.51W	21.53
0460	45-36.48N	61-21.51W	43.97
0461	45-36.46N	61-21.44W	76.82
0462	45-36.46N	61-21.37W	49.73
0463	45-36.44N	61-21.29W	7.11
0464	45-36.42N	61-21.22W	19.06
0465	45-36.42N	61-21.22W	37.38
0466	45-36.84N	61-21.96W	77.46
0467	45-36.84N	61-21.96W	20.50

VALUES = 20

MINIMUM = 7.11	MAXIMUM = 77.46	RANGE = 70.35
AVERAGE = 33.82	STD DEV = 19.09	STDERR = 4.27
VARIANCE = 364.33	SKEWNESS = 0.90	KURTOSIS = 0.08

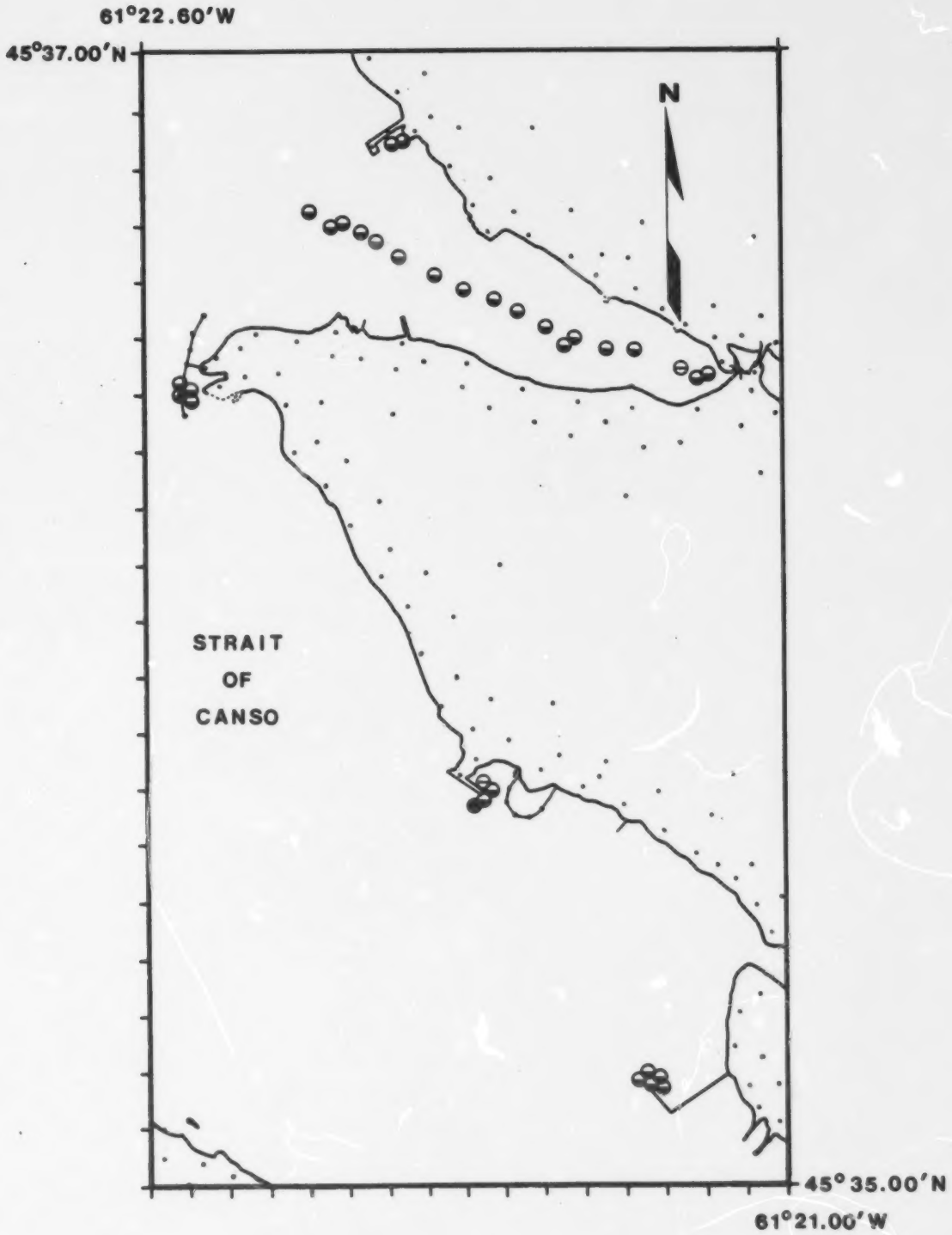
POINT TUPPER, Nova Scotia

Point Tupper is located in an industrial region which includes a Gulf Oil Refinery (Wright Point), the Nova Scotia Forest Products Plant (Madden Point) and the Bestwall Gypsum Co. (Point Tupper). Facilities at the Georgia Pacific Corporation Terminal in Point Tupper are capable of mooring ships over 200m in length. There is no dredging history for this locality. Sediments in the area are not reported to be contaminated by oil.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0468	45-35.15N	61-21.32W	62.60
0469	45-35.15N	61-21.32W	41.93
0470	45-35.15N	61-21.32W	42.23
0471	45-35.15N	61-21.32W	15.29
0472	45-35.15N	61-21.32W	51.66
0473	45-35.68N	61-21.73W	247.00
0474	45-35.68N	61-21.73W	36.89
0475	45-35.71N	61-21.71W	10.95
0476	45-35.71N	61-21.71W	6.04
0477	45-36.42N	61-21.46W	60.46
0478	45-36.42N	61-22.46W	47.07
0479	45-36.42N	61-22.46W	16.74
0480	45-36.42N	61-22.46W	45.36

VALUES = 13

MINIMUM = 6.04	MAXIMUM = 247.0	RANGE = 240.96
AVERAGE = 52.63	STD DEV = 61.30	STDERR = 17.00
VARIANCE = 3757.1	SKEWNESS = 2.36	KURTOSIS = 4.84


61°22.60'W
45°37.00'N
N
STRAIT
OF
CANSO
45°35.00'N
61°21.00'W

PETIT-DE-GRAT, Nova Scotia

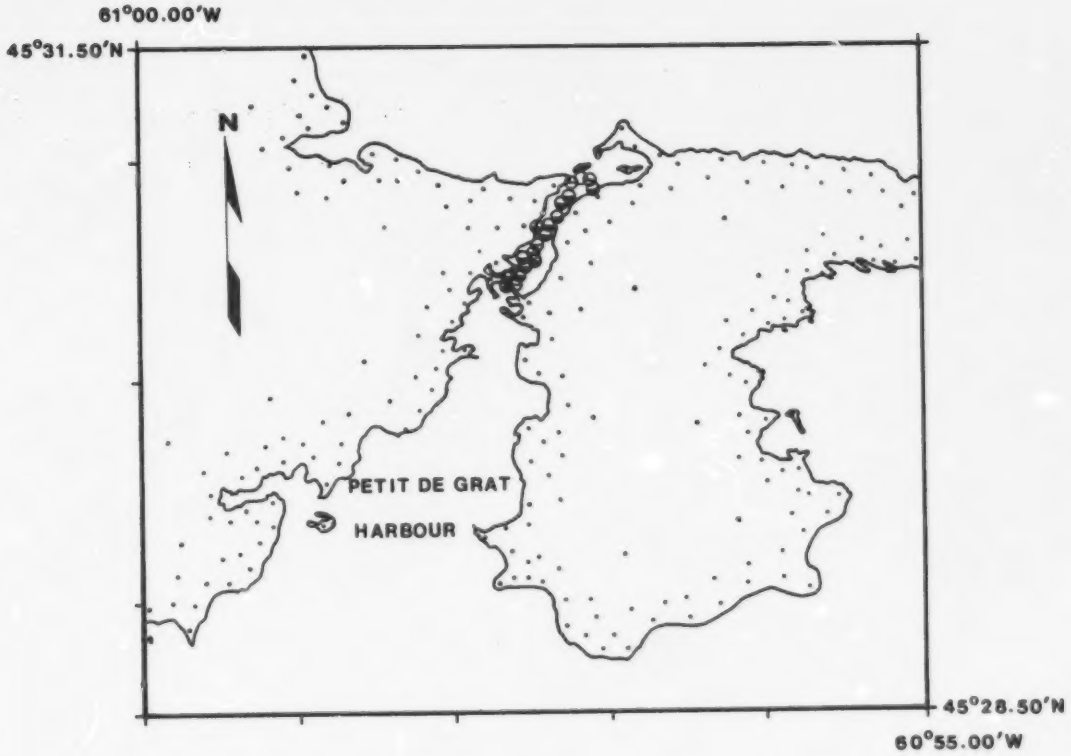
Petit-de-Grat (population 760 in 1976) is not located near industrial or urban centers. One large fish plant (Richmond Fisheries Ltd.) employs 300 residents.

Although Petit de Gras was located in the vicinity of the Arrow oil spill, it did not appear to be directly influenced by it. Sediments (predominantly gravel/sand/silt) are reported to be oil contaminated at levels of 860 - 8100 ppm. It is not a frequently dredged site.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0481	45-30.50N	60-57.57W	32.55
0482	45-30.54N	60-57.51W	10.39
0483	45-30.54N	60-57.51W	11.32
0484	45-30.57N	60-57.45W	7.45
0485	45-30.62N	60-57.41W	9.11
0486	45-30.68N	60-57.39W	39.59
0487	45-30.68N	60-57.39W	40.29
0488	45-30.68N	60-57.39W	25.15
0489	45-30.73N	60-57.35W	47.90
0490	45-30.78N	60-57.29W	15.32
0491	45-30.83N	60-57.21W	21.66
0492	45-30.87N	60-57.15W	12.87
0493	45-30.91N	60-57.17W	6.84
0494	45-30.91N	60-57.20W	1.03
0495	45-30.90N	60-57.23W	2.88
0496	45-30.48N	60-57.62W	14.96
0497	45-30.48N	60-57.62W	7.11
0498	45-30.48N	60-57.62W	17.51
0499	45-30.47N	60-57.62W	17.69

VALUES = 19

MINIMUM = 1.03	MAXIMUM = 47.90	RANGE = 46.87
AVERAGE = 17.98	STD DEV = 13.39	STDERR = 3.07
VARIANCE = 179.38	SKEWNESS = 0.83	KURTOSIS = -0.54


61°00.00'W
45°31.50'N
N
PETIT DE GRAT
HARBOUR
45°28.50'N
60°55.00'W

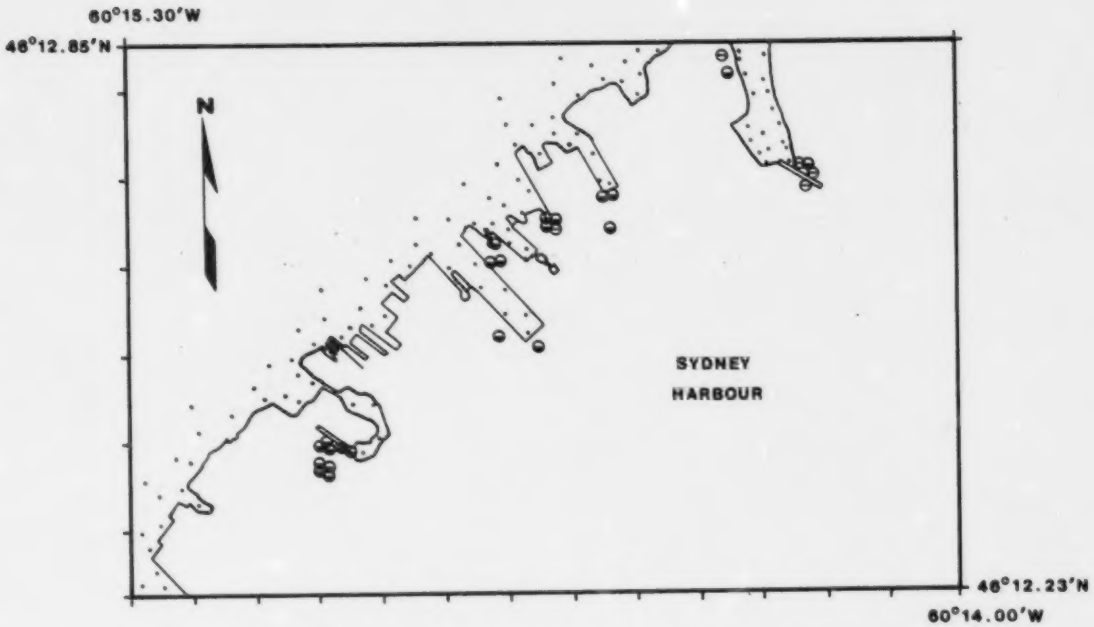
NORTH SYDNEY/SYDNEY, Nova Scotia

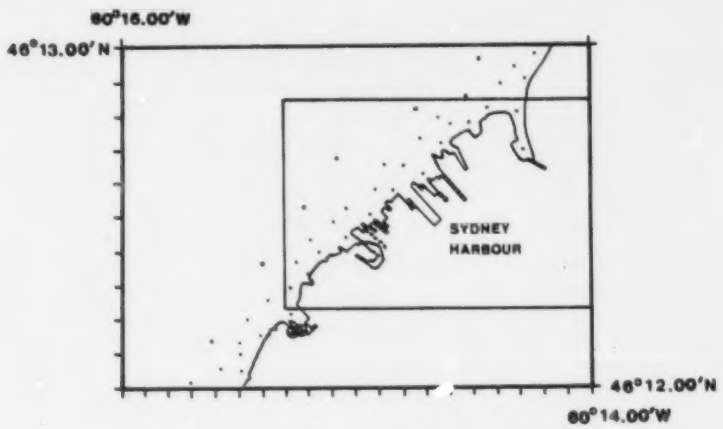
Sydney (population 30700 in 1976) is a steel manufacturing centre and primary shipping point for coal fields which lie in the surrounding area. The mainland terminus for CN Marine Services to Newfoundland, and several fish plants (National Sea Products and H.B. Nickerson Ltd.) are located in town of North Sydney (population (11000) on the west side of Sydney Harbour.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0500	46-12.72N	60-14.24W	5.62
0501	46-12.72N	60-14.23W	18.72
0502	46-12.70N	60-14.22W	6.12
0503	46-12.68N	60-14.23W	1.60
0504	46-12.84N	60-14.36W	5.00
0505	46-12.82N	60-14.35W	36.19
0506	46-12.67N	60-14.55W	20.58
0507	46-12.67N	60-14.55W	22.23
0508	46-12.64N	60-14.53W	20.55
0509	46-12.65N	60-14.62W	18.87
0510	46-12.65N	60-14.62W	9.07
0511	46-12.65N	60-14.62W	20.62
0512	46-12.65N	60-14.62W	22.01
0513	46-12.63N	60-14.72W	21.16
0514	46-12.60N	60-14.72W	26.31
0515	46-12.60N	60-14.72W	12.69
0516	46-12.51N	60-14.65W	16.32
0517	46-12.52N	60-14.72W	14.98
0518	46-12.17N	60-15.26W	81.41
0519	46-12.17N	60-15.26W	61.72
0520	46-12.37N	60-14.99W	34.61
0521	46-12.37N	60-14.99W	42.58
0522	46-12.37N	60-14.99W	48.15
0523	46-12.37N	60-14.99W	25.96
0524	46-12.39N	60-14.99W	25.22
0525	46-12.39N	60-14.99W	51.38
0526	46-12.39N	60-14.99W	20.72
0527	46-12.38N	60-14.96W	14.61
0528	46-12.38N	60-14.96W	32.99

VALUES = 29

MINIMUM = 1.60	MAXIMUM = 81.41	RANGE = 79.81
AVERAGE = 25.45	STD DEV = 17.83	STDERR = 3.31
VARIANCE = 317.98	SKEWNESS = 1.29	KURTOSIS = 1.54


60°15.30'W
46°12.85'N
N
SYDNEY
HARBOUR
46°12.23'N
60°14.00'W


60°15.00'W
46°13.00'N
SYDNEY
HARBOUR
46°12.00'N
60°14.00'W

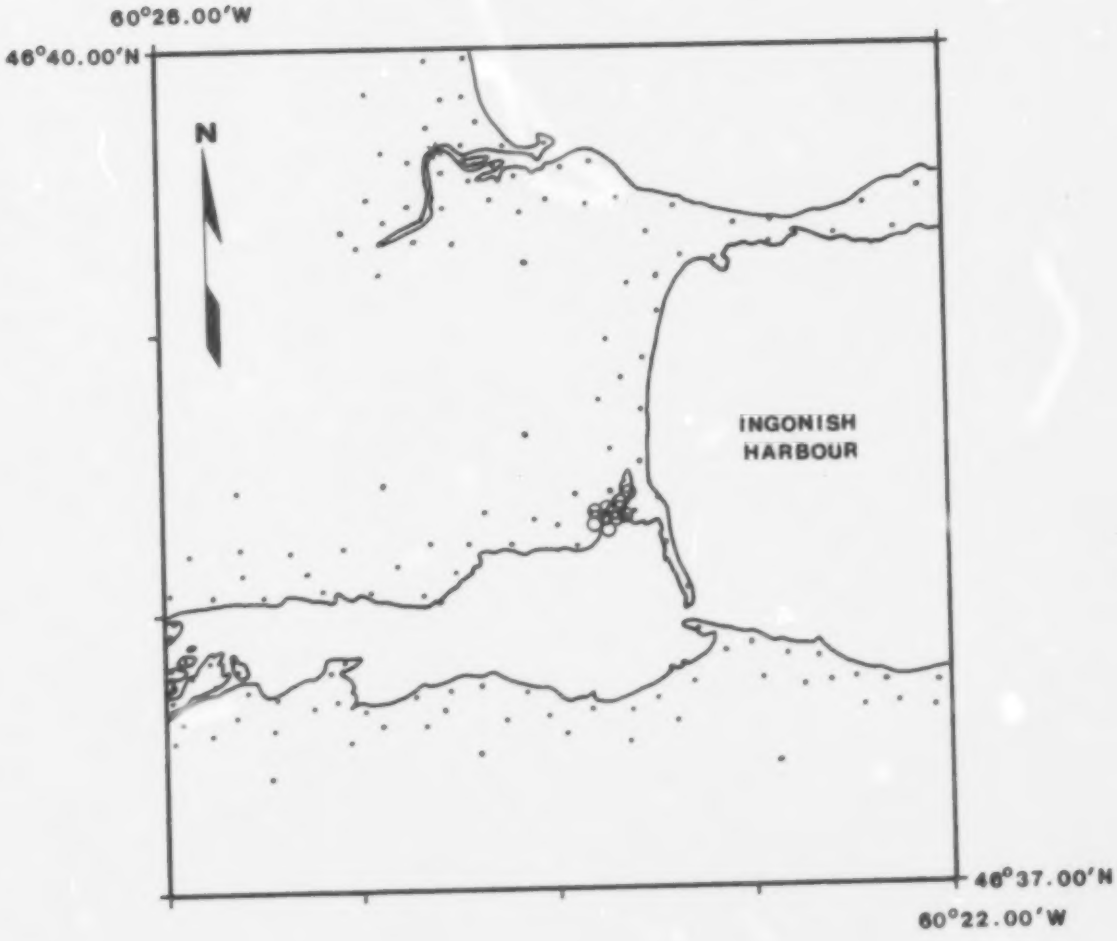
INGONISH FERRY, Nova Scotia

The village of Ingonish Ferry (population 50 in 1976) is situated in a resort area. Since the village is quite distant from industrial, fishing and urban centers, samples from the region should serve as an indicator of background petroleum levels. There is no history of the sandy sediments in this locality being dredged. A shoal at the entrance to the harbour eliminates most marine traffic at low water.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0529	46-38.35N	60-23.66W	2.58
0530	46-38.32N	60-23.67W	2.16
0531	46-38.32N	60-23.67W	0.89
0532	46-38.32N	60-23.67W	6.25
0533	46-38.32N	60-23.67W	3.17
0534	46-38.32N	60-23.67W	2.55
0535	46-38.32N	60-23.67W	1.00
0536	46-38.32N	60-23.65W	1.79
0537	46-38.41N	60-23.63W	4.15

VALUES = 9

MINIMUM = 0.89	MAXIMUM = 6.25	RANGE = 5.36
AVERAGE = 2.73	STD DEV = 1.67	STDERR = 0.56
VARIANCE = 2.78	SKEWNESS = 0.82	KURTOSIS = -0.42


60°28.00'W
46°40.00'N
N
INGONISH
HARBOUR
46°37.00'N
60°22.00'W

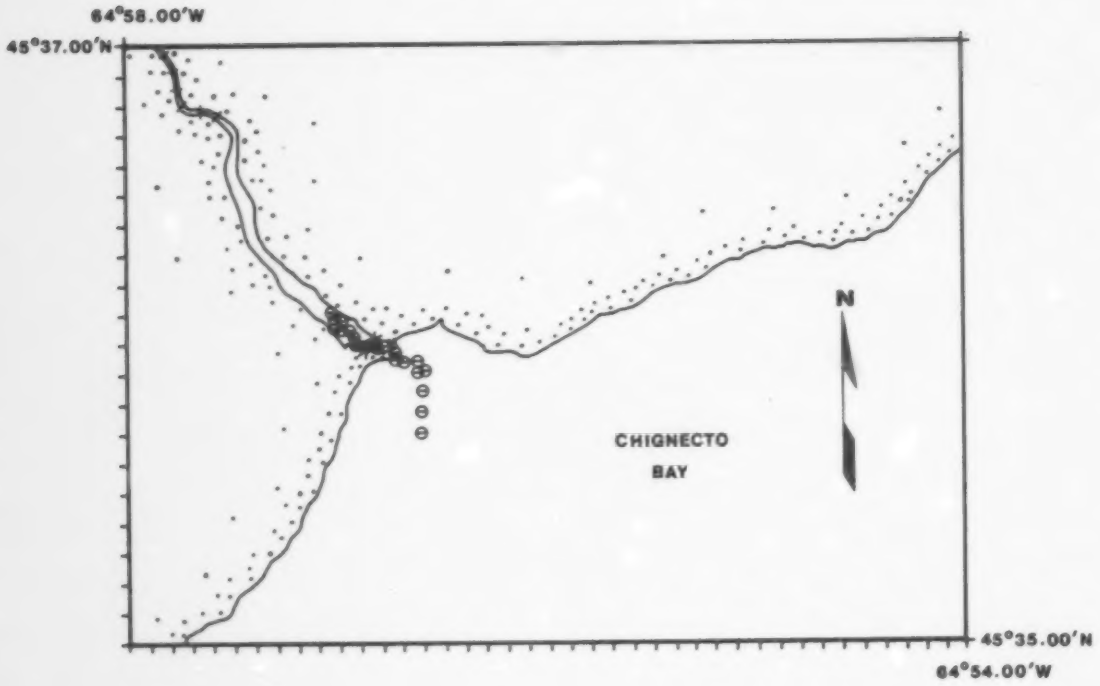
ALMA, New Brunswick

The village of Alma on the north side of the entrance to the upper Salmon River is supported primarily by fishing. There is no available data on previous dredging activity in the area.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0538	45-35.99N	64-56.87W	2.48
0539	45-35.99N	64-56.88W	2.13
0540	45-36.00N	64-56.86W	2.63
0541	45-35.99N	64-56.89W	2.18
0542	45-35.99N	64-56.89W	2.89
0543	45-36.01N	64-56.94W	1.70
0544	45-36.04N	64-56.95W	1.89
0545	45-36.04N	64-56.99W	3.02
0546	45-36.04N	64-56.99W	2.28
0547	45-36.06N	64-56.98W	3.51
0548	45-36.06N	64-56.98W	2.59
0549	45-36.10N	64-57.01W	2.88
0550	45-35.97N	64-56.76W	2.58
0551	45-35.98N	64-56.76W	1.11
0552	45-35.94N	64-56.68W	2.93
0553	45-35.90N	64-56.61W	3.73
0554	45-35.90N	64-56.61W	3.92
0555	45-35.84N	64-56.60W	3.02
0556	45-35.77N	64-56.60W	1.79
0557	45-35.70N	64-56.61W	2.31
0558	45-35.95N	64-56.75W	2.38

VALUES = 21

MINIMUM = 1.11	MAXIMUM = 3.92	RANGE = 2.81
AVERAGE = 2.57	STD DEV = 0.68	STDERR = 0.15
VARIANCE = 0.46	SKEWNESS = 0.06	KURTOSIS = -0.39


64°58.00'W
45°37.00'N
N
CHIGNECTO
BAY
45°35.00'N
64°54.00'W

SAINT JOHN, New Brunswick

The city of Saint John (population 113000 in 1976) located at the mouth of the Saint John River, is highly industrialized (eg. oil refinery, two pulp and paper mills, sugar refinery). The harbour, with one of the largest graving-docks in the world, has facilities to support large ships. The area is a frequent dredging site. Harbour sediments from this locality are reported to be contaminated by oil at concentrations as high as 1150 ppm.

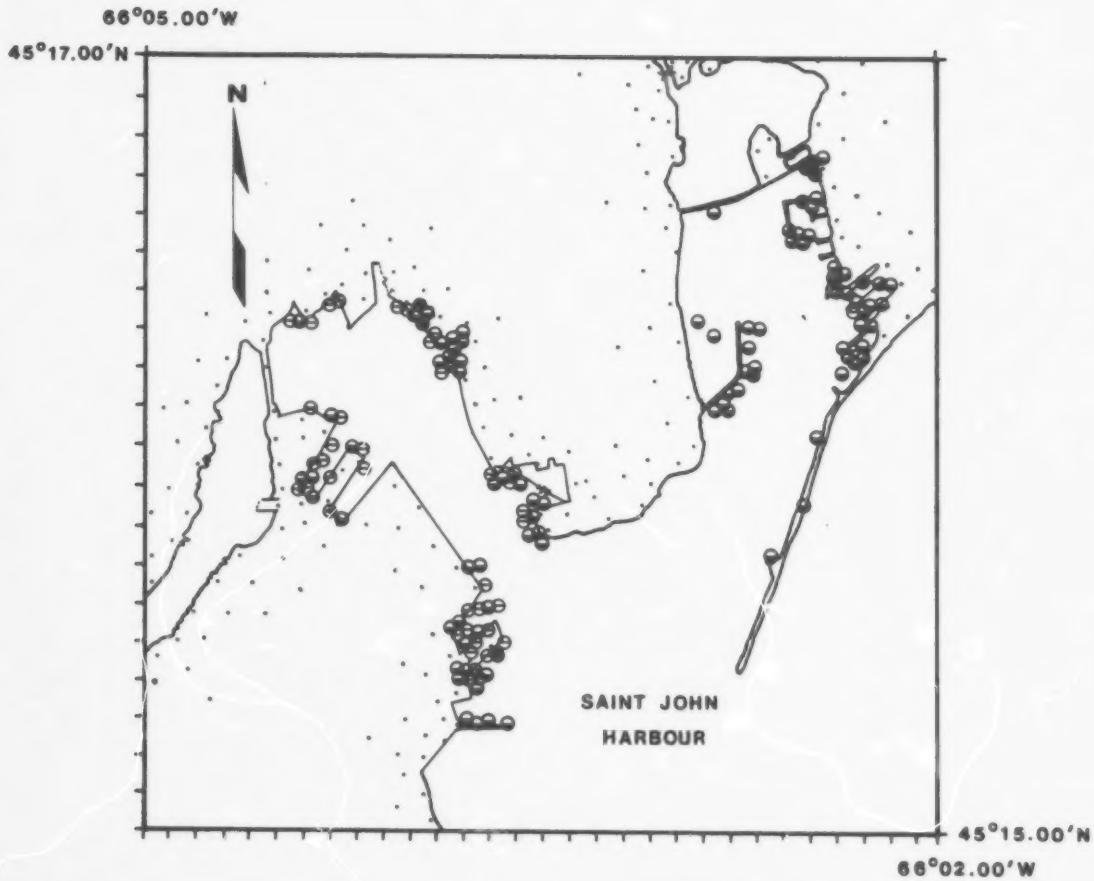
SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0559	45-16.08N	66-04.37W	5.90
0560	45-16.06N	66-04.27W	19.40
0561	45-16.06N	66-04.27W	9.09
0562	45-16.00N	66-04.30W	6.63
0563	45-15.95N	66-04.34W	5.08
0564	45-15.95N	66-04.34W	9.08
0565	45-15.91N	66-04.38W	10.13
0566	45-15.91N	66-04.38W	12.87
0567	45-15.87N	66-04.38W	4.46
0568	45-15.87N	66-04.38W	6.04
0569	45-15.85N	66-04.35W	6.23
0570	45-15.91N	66-04.30W	6.23
0571	45-15.98N	66-04.20W	8.30
0572	45-15.98N	66-04.20W	6.44
0573	45-15.94N	66-04.17W	5.54
0574	45-15.82N	66-04.29W	7.91
0575	45-15.80N	66-04.24W	18.34
0576	45-15.28N	66-03.74W	17.07
0577	45-15.28N	66-03.74W	14.69
0578	45-15.28N	66-03.75W	18.73
0579	45-15.27N	66-03.62W	10.44
0580	45-16.02N	66-02.87W	44.42
0581	45-16.10N	66-02.82W	13.40
0582	45-16.10N	66-02.88W	26.29
0583	45-16.12N	66-02.83W	66.12
0584	45-16.14N	66-02.78W	40.36
0585	45-16.14N	66-02.78W	17.55
0586	45-16.18N	66-02.73W	16.58
0587	45-16.18N	66-02.73W	17.95
0588	45-16.18N	66-02.73W	35.85
0589	45-16.23N	66-02.73W	20.90
0590	45-16.30N	66-02.73W	22.41
0591	45-16.28N	66-02.85W	26.76
0592	45-16.31N	66-02.92W	23.51
0593	45-16.60N	66-02.85W	75.08
0594	45-16.73N	66-02.47W	83.45
0595	45-16.73N	66-02.47W	186.00
0596	45-16.72N	66-02.50W	361.80
0597	45-16.72N	66-02.50W	110.80
0598	45-16.64N	66-02.46W	78.09
0599	45-16.63N	66-02.55W	52.70
0600	45-16.55N	66-02.54W	29.61
0601	45-16.55N	66-02.54W	37.57
0602	45-16.55N	66-02.54W	29.18
0603	45-16.53N	66-02.54W	21.98
0604	45-16.54N	66-02.52W	14.88
0605	45-16.63N	66-02.48W	11.80
0606	45-16.44N	66-02.39W	36.15
0607	45-16.44N	66-02.39W	32.61

0608	45-16.44N	66-02.39W	38.20
0609	45-16.40N	66-02.39W	35.06
0610	45-16.40N	66-02.39W	25.13
0611	45-16.39N	66-02.35W	21.93
0612	45-16.42N	66-02.31W	316.50
0613	45-16.34N	66-02.31W	14.21
0614	45-16.34N	66-02.31W	4.76
0615	45-16.41N	66-02.18W	40.77
0616	45-16.41N	66-02.18W	21.82
0617	45-16.36N	66-02.23W	27.86
0618	45-16.36N	66-02.23W	35.87
0619	45-16.30N	66-02.28W	16.07
0620	45-16.30N	66-02.28W	23.93
0621	45-16.25N	66-02.33W	35.52
0622	45-16.25N	66-02.33W	24.66
0623	45-16.23N	66-02.33W	39.80
0624	45-16.25N	66-02.33W	32.59
0625	45-16.25N	66-02.33W	5.27
0626	45-16.25N	66-02.33W	24.79
0627	45-16.18N	66-02.40W	25.45
0628	45-16.03N	66-02.49W	19.06
0629	45-15.85N	66-02.56W	12.39
0630	45-15.72N	66-02.66W	19.24
0631	45-15.61N	66-02.70W	9.91
0632	45-15.61N	66-02.70W	10.38
0633	45-15.43N	66-02.78W	25.62
0634	45-15.43N	66-02.78W	17.76
0635	45-15.43N	66-02.78W	20.17
0636	45-15.43N	66-02.72W	15.05
0637	45-15.37N	66-03.75W	10.25
0638	45-15.40N	66-03.76W	3.14
0639	45-15.40N	66-03.76W	7.39
0640	45-15.40N	66-03.76W	5.24
0641	45-15.47N	66-03.70W	8.00
0642	45-15.47N	66-03.70W	249.00
0643	45-15.49N	66-03.64W	5.97
0644	45-15.51N	66-03.75W	15.37
0645	45-15.51N	66-03.75W	7.23
0646	45-15.47N	66-03.79W	5.84
0647	45-15.47N	66-03.79W	7.45
0648	45-15.47N	66-03.79W	12.02
0649	45-15.52N	66-03.81W	9.53
0650	45-15.52N	66-03.81W	10.75
0651	45-15.52N	66-03.81W	6.27
0652	45-15.52N	66-03.81W	6.56
0653	45-15.56N	66-03.77W	7.76
0654	45-15.56N	66-03.77W	6.96
0655	45-15.63N	66-03.71W	5.78
0656	45-15.68N	66-03.77W	39.48
0657	45-15.68N	66-03.77W	15.98
0658	45-15.78N	66-03.53W	11.48
0659	45-15.78N	66-03.53W	13.85
0660	45-15.76N	66-03.51W	26.57
0661	45-15.83N	66-03.56W	10.15
0662	45-15.83N	66-03.56W	4.62
0663	45-15.83N	66-03.56W	5.84
0664	45-15.86N	66-03.52W	25.87
0665	45-15.86N	66-03.52W	20.70
0666	45-15.93N	66-03.66W	14.74
0667	45-15.93N	66-03.66W	3.77
0668	45-15.93N	66-03.66W	21.21
0669	45-15.93N	66-03.68W	8.62
0670	45-15.93N	66-03.68W	16.71
0671	45-15.93N	66-03.68W	18.23
0672	45-16.24N	66-03.83W	8.73

0673	45-16.24N	66-03.83W	10.78
0674	45-16.24N	66-03.83W	9.98
0675	45-16.24N	66-03.83W	15.24
0676	45-16.24N	66-03.83W	11.81
0677	45-16.24N	66-03.83W	15.24
0678	45-16.26N	66-03.81W	20.83
0679	45-16.26N	66-03.81W	16.17
0680	45-16.26N	66-03.81W	16.73
0681	45-16.26N	66-03.81W	14.97
0682	45-16.26N	66-03.88W	18.84
0683	45-16.26N	66-03.88W	6.53
0684	45-16.26N	66-03.88W	6.86
0685	45-16.33N	66-03.96W	180.50
0686	45-16.33N	66-03.96W	137.50
0687	45-16.33N	66-03.96W	51.52
0688	45-16.33N	66-03.96W	45.48
0689	45-16.35N	66-04.03W	7.00
0690	45-16.35N	66-04.03W	8.72
0691	45-16.37N	66-04.27W	5.15
0692	45-16.37N	66-04.27W	6.28
0693	45-16.32N	66-04.40W	6.37
0694	45-16.32N	66-04.40W	15.82
0695	45-16.32N	66-04.47W	3.21
0696			9.23

VALUES = 138

MINIMUM = 3.10	MAXIMUM = 361.8	RANGE = 358.7
AVERAGE = 28.92	STD DEV = 50.65	STDERR = 4.31
VARIANCE = 2565.8	SKEWNESS = 4.48	KURTOSIS = 22.12


66°05.00'W
45°17.00'N
N
SAINT JOHN
HARBOUR
45°15.00'N
66°02.00'W

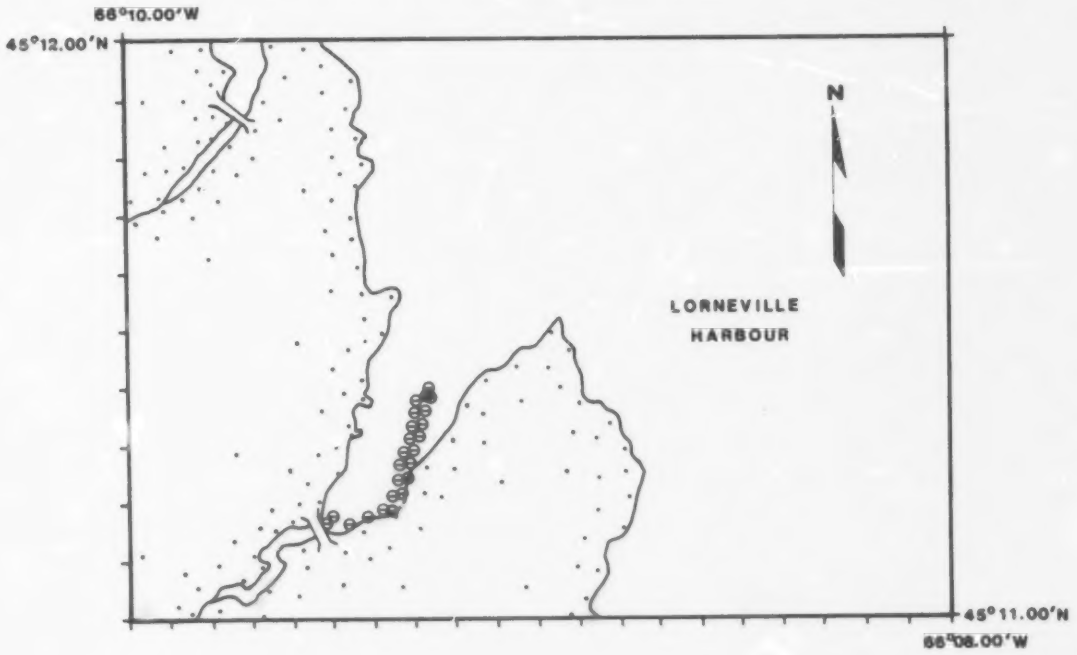
LORNEVILLE, New Brunswick

The entrance of Lorneville Harbour is between Lorneville Point Seely Point. Most of the harbour dries at low water.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0697	45-11.37N	66-09.27W	4.12
0698	45-11.39N	66-09.27W	3.80
0699	45-11.37N	66-09.28W	4.50
0700	45-11.37N	66-09.28W	2.70
0701	45-11.35N	66-09.29W	4.83
0702	45-11.35N	66-09.29W	4.92
0703	45-11.32N	66-09.30W	4.19
0704	45-11.32N	66-09.30W	4.42
0705	45-11.30N	66-09.31W	3.86
0706	45-11.30N	66-09.31W	3.78
0707	45-11.28N	66-09.32W	4.94
0708	45-11.28N	66-09.32W	3.05
0709	45-11.26N	66-09.33W	4.27
0710	45-11.26N	66-09.33W	2.15
0711	45-11.23N	66-09.34W	2.60
0712	45-11.23N	66-09.34W	1.74
0713	45-11.21N	66-09.35W	2.34
0714	45-11.21N	66-09.35W	1.45
0715	45-11.18N	66-09.37W	3.90
0716	45-11.18N	66-09.36W	3.01
0717	45-11.17N	66-09.42W	5.53
0718	45-11.17N	66-09.46W	3.68
0719	45-11.18N	66-09.51W	3.42
0720	45-11.17N	66-09.52W	2.20

VALUES = 24

MINIMUM = 1.45	MAXIMUM = 5.53	RANGE = 4.08
AVERAGE = 3.56	STD DEV = 1.10	STDERR = 0.22
VARIANCE = 1.21	SKEWNESS = -0.22	KURTOSIS = -1.04


66°10.00'W
45°12.00'N
N
LORNEVILLE
HARBOUR
45°11.00'N
66°08.00'W

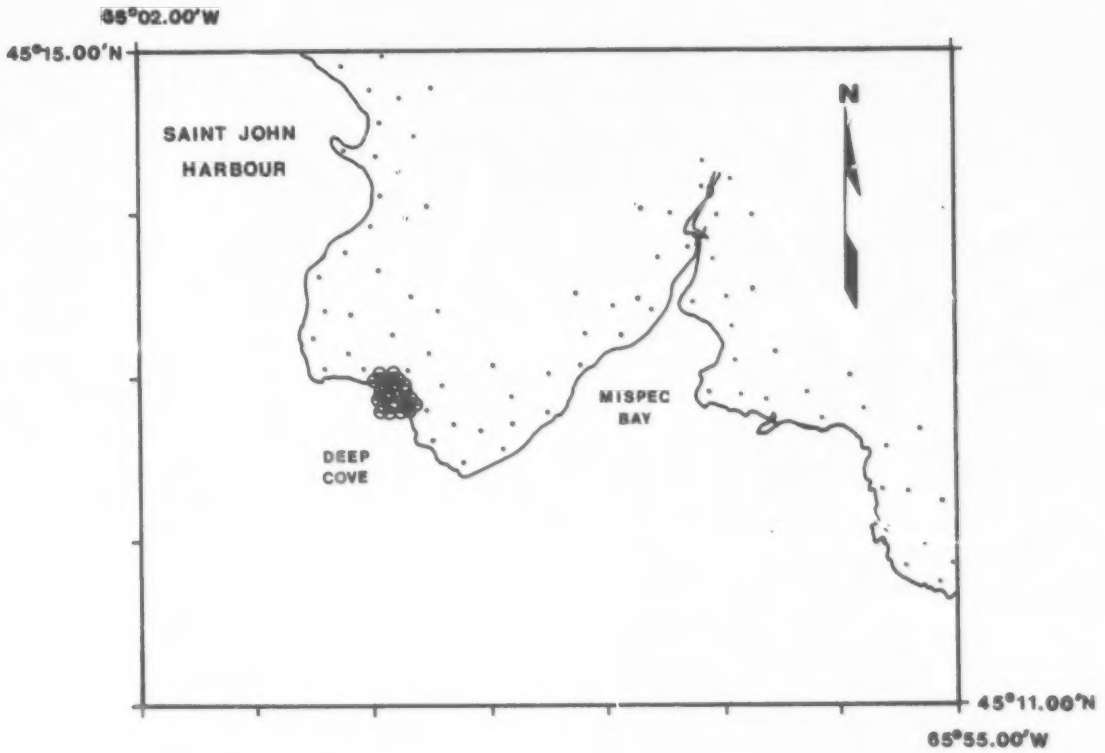
DEEP COVE, New Brunswick

An Irving Oil storage area for an offshore floating terminal is situated at Deep Cove located WNW of Canapar.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0721	45-13.00N	65-59.88W	2.29
0722	45-12.99N	65-59.89W	1.26
0723	45-12.99N	65-59.88W	2.53
0724	45-12.98N	65-59.86W	3.07
0725	45-12.98N	65-59.87W	1.29
0726	45-12.97N	65-59.87W	1.34
0727	45-12.97N	65-59.84W	2.27
0728	45-12.96N	65-59.82W	2.45
0729	45-12.94N	65-59.81W	1.86
0730	45-12.94N	65-59.82W	3.00
0731	45-12.93N	65-59.83W	1.79
0732	45-12.93N	65-59.79W	1.97
0733	45-12.92N	65-59.77W	3.08
0734	45-12.91N	65-59.77W	1.88
0735	45-12.90N	65-59.76W	2.57
0736	45-12.89N	65-59.77W	3.49
0737	45-12.89N	65-59.75W	2.54
0738	45-12.89N	65-59.75W	2.48
0739	45-12.89N	65-59.75W	2.65
0740	45-12.89N	65-59.76W	1.43
0741	45-12.89N	65-59.76W	0.45
0742	45-12.89N	65-59.76W	1.51
0743	45-12.89N	65-59.74W	3.58
0744	45-12.88N	65-59.73W	2.46

VALUES = 24

MINIMUM = 0.45	MAXIMUM = 3.58	RANGE = 3.13
AVERAGE = 2.22	STD DEV = 0.77	STDERR = 0.16
VARIANCE = 0.59	SKEWNESS = -0.22	KURTOSIS = -0.57


66°02.00'W
45°15.00'N
SAINT JOHN
HARBOUR
N
MISPEC
BAY
DEEP
COVE
45°11.00'N
65°55.00'W

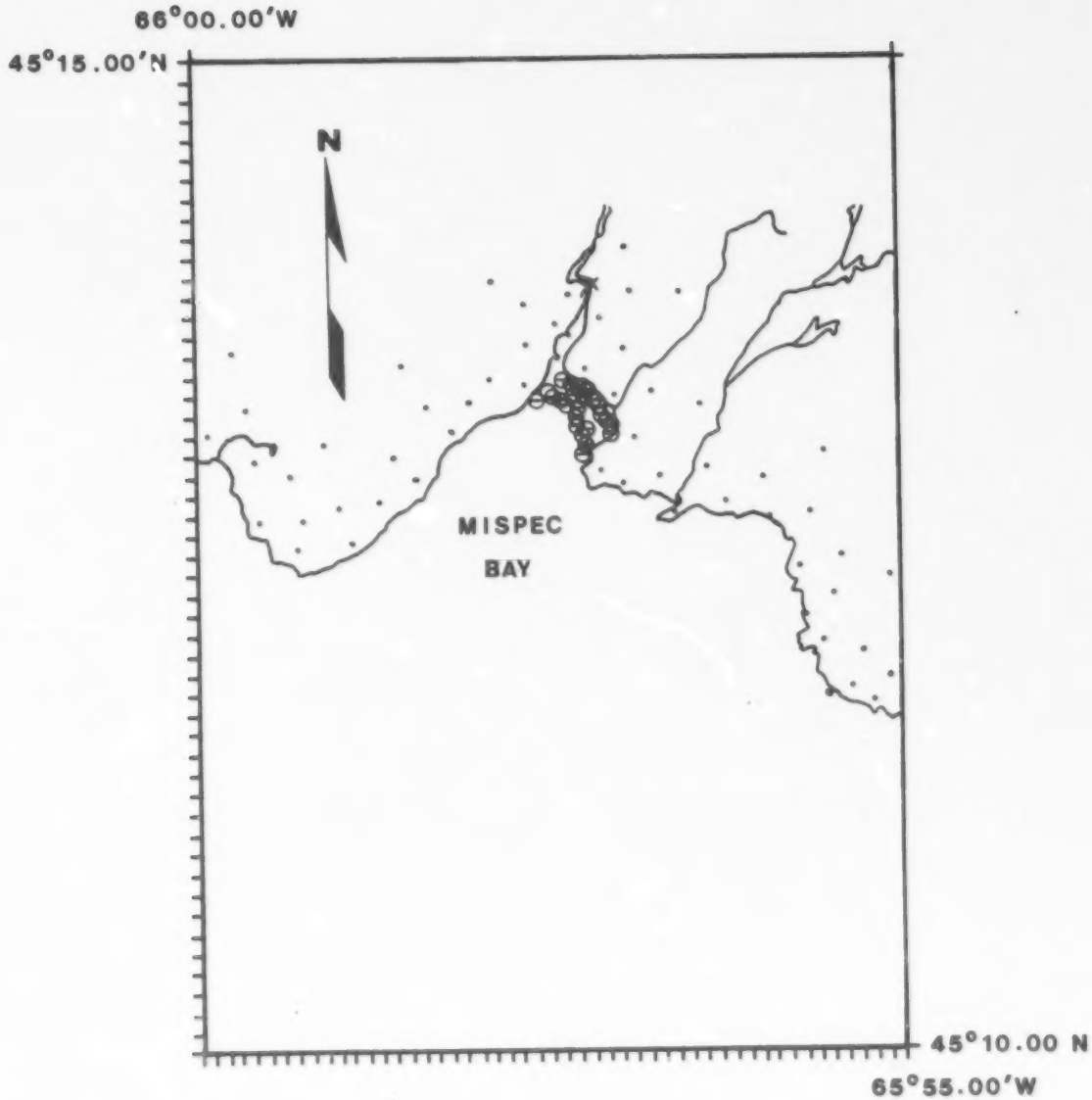
MISPEC, New Brunswick

Mispec Bay is located at the head of the Mispec River.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0745	45-13.27N	65-57.16W	2.64
0746	45-13.24N	65-57.13W	2.15
0747	45-13.21N	65-57.10W	2.25
0748	45-13.18N	65-57.07W	1.11
0749	45-13.15N	65-57.04W	2.00
0750	45-13.12N	65-57.02W	1.97
0751	45-13.05N	65-57.22W	3.30
0752	45-13.08N	65-57.22W	4.84
0753	45-13.10N	65-57.22W	1.28
0754	45-13.12N	65-57.25W	2.79
0755	45-13.15N	65-57.27W	2.79
0756	45-13.19N	65-57.29W	2.34
0757	45-13.21N	65-57.32W	2.45
0758	45-13.24N	65-57.35W	1.53
0759	45-13.26N	65-57.39W	1.15
0760	45-13.28N	65-57.43W	2.18
0761	45-13.31N	65-57.50W	0.99
0762	45-13.28N	65-57.56W	2.64
0763	45-13.36N	65-57.31W	2.55
0764	45-13.35N	65-57.29W	2.49
0765	45-13.34N	65-57.26W	1.34
0766	45-13.32N	65-57.23W	1.26
0767	45-13.31N	65-57.21W	4.17
0768	45-13.29N	65-57.19W	1.97

VALUES = 24

MINIMUM = 0.99	MAXIMUM = 4.84	RANGE = 3.85
AVERAGE = 2.26	STD DEV = 0.94	STDERR = 0.19
VARIANCE = 0.88	SKEWNESS = 0.90	KURTOSIS = 0.68


66°00.00'W
45°15.00'N
N
MISPEC
BAY
45°10.00 N
65°55.00'W

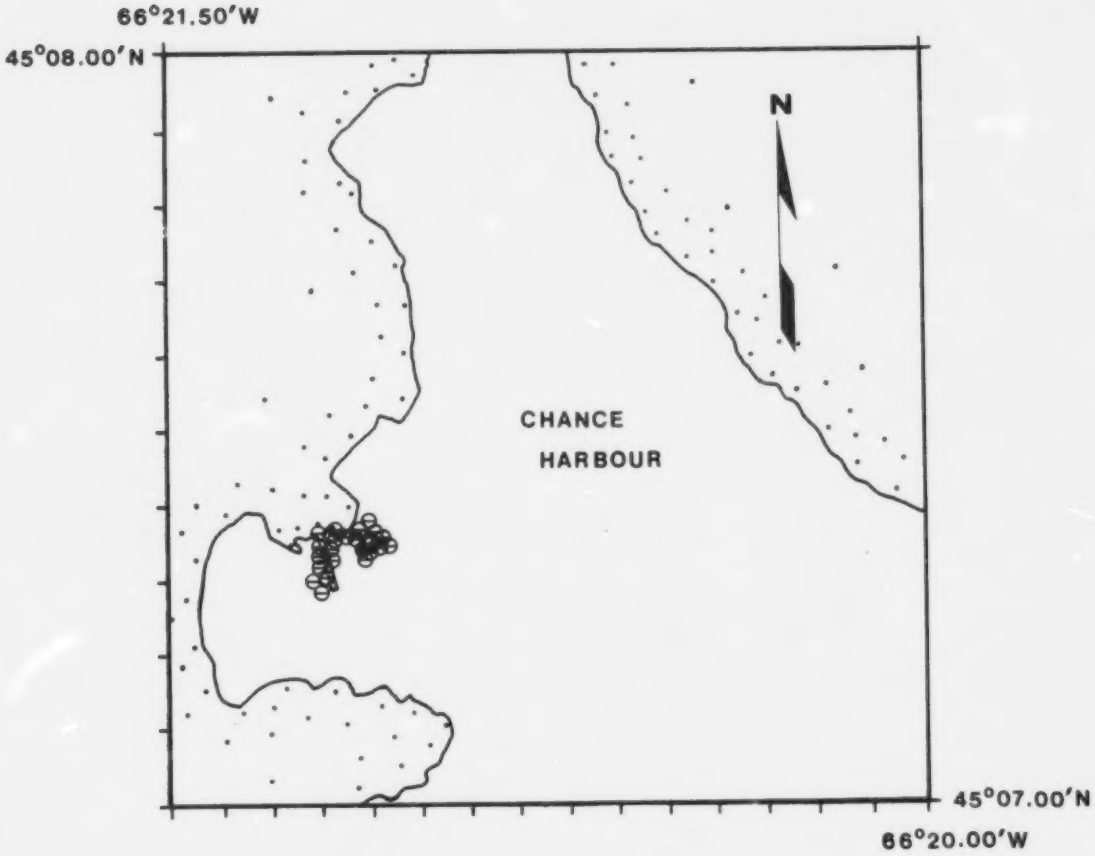
CHANCE HARBOUR, New Brunswick

The village of Chance Harbour is situated on the west side of the harbour which has its entrance between Reef Point and Cranberry Head.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0769	45-07.36N	66-21.11W	4.80
0770	45-07.36N	66-21.11W	11.66
0771	45-07.35N	66-21.11W	7.16
0772	45-07.35N	66-21.11W	3.10
0773	45-07.35N	66-21.12W	185.00
0774	45-07.36N	66-21.13W	4.69
0775	45-07.36N	66-21.13W	26.65
0776	45-07.37N	66-21.13W	3.20
0777	45-07.36N	66-21.14W	3.17
0778	45-07.36N	66-21.14W	7.17
0779	45-07.36N	66-21.15W	3.68
0780	45-07.36N	66-21.15W	2.02
0781	45-07.36N	66-21.17W	2.55
0782	45-07.35N	66-21.18W	1.88
0783	45-07.35N	66-21.18W	4.74
0784	45-07.34N	66-21.19W	3.07
0785	45-07.33N	66-21.19W	3.27
0786	45-07.31N	66-21.20W	2.06
0787	45-07.31N	66-21.20W	4.27
0788	45-07.32N	66-21.20W	2.93
0789	45-07.34N	66-21.20W	3.13
0790	45-07.35N	66-21.20W	2.24
0791	45-07.37N	66-21.20W	1.74
0792	45-07.28N	66-21.20W	1.51

VALUES = 24

MINIMUM = 1.50	MAXIMUM = 185	RANGE = 183.5
AVERAGE = 12.32	STD DEV = 37.14	STDERR = 7.58
VARIANCE = 1379.44	SKEWNESS = 4.18	KURTOSIS = 16.47


66°21.50'W
45°08.00'N
N
CHANCE
HARBOUR
45°07.00'N
66°20.00'W

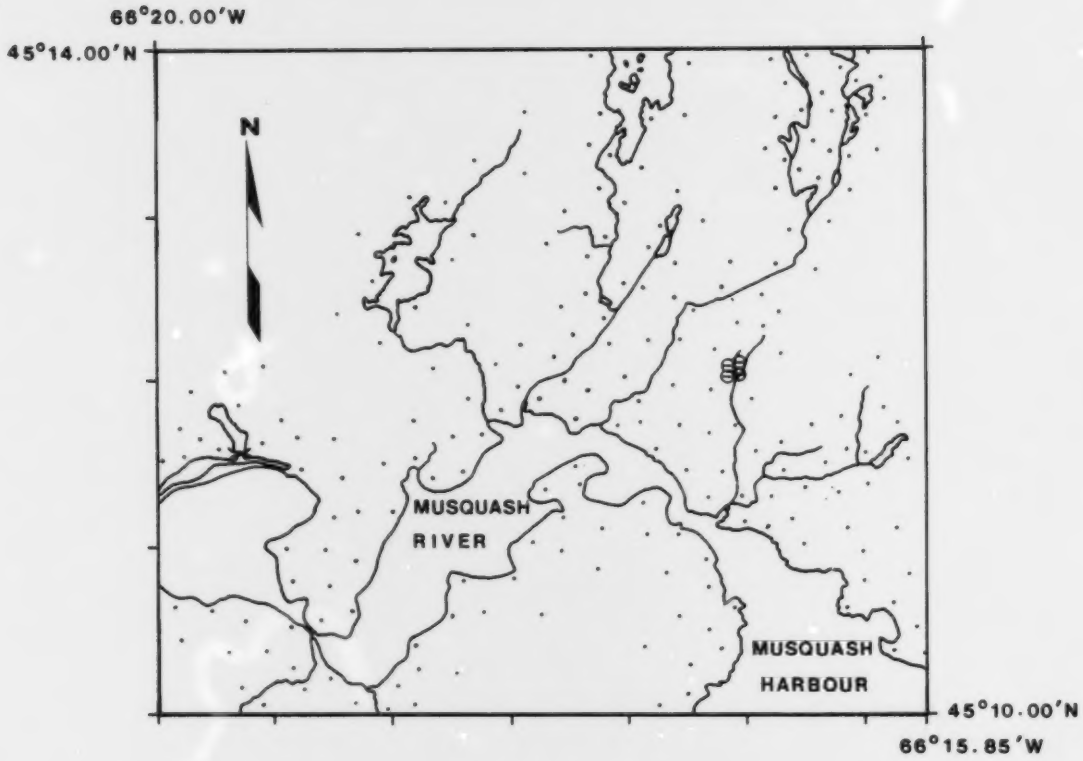
MUSQUASH RIVER, New Brunswick

Samples may have been collected from Ferguson Creek.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0793	45-12.05N	66-15.09W	3.59
0794	45-12.05N	66-15.09W	2.52
0795	45-12.05N	66-15.09W	3.26
0796	45-12.05N	66-15.09W	2.86

VALUES = 4

MINIMUM = 2.50	MAXIMUM = 3.59	RANGE = 1.09
AVERAGE = 3.06	STD DEV = 0.47	STDERR = 0.23
VARIANCE = 0.22	SKEWNESS = -0.01	KURTOSIS = -2.12


66°20.00'W
45°14.00'N
N
MUSQUASH
RIVER
MUSQUASH
HARBOUR
45°10.00'N
66°15.85'W

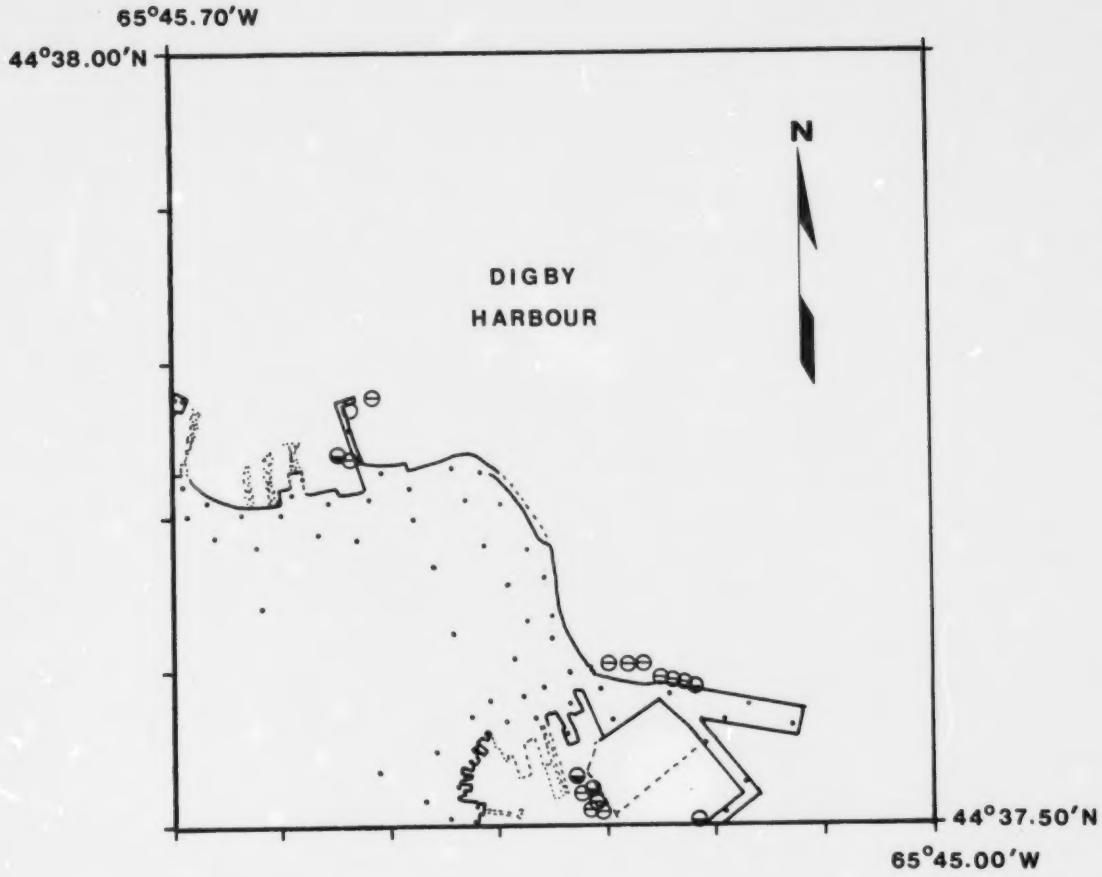
DIGBY, Nova Scotia

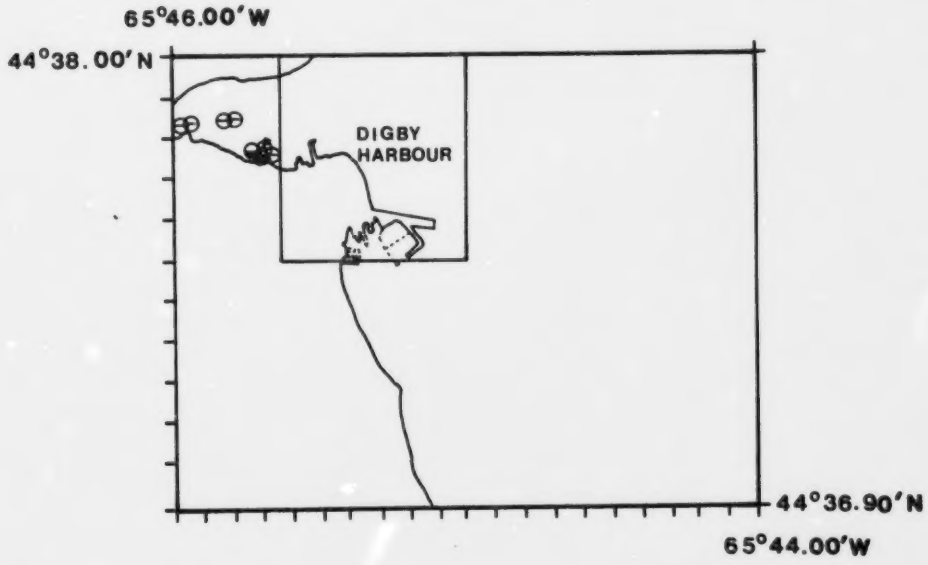
Government wharves, an oil berth and the CN ferry terminal are found in Digby which is situated on the west side of the Annapolis Basin, Bay of Fundy. Local industries in the region include commercial fishing, lumbering and farming. The area is not reported to be oil contaminated. There is no dredging history available for this locality.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0797	44-37.83N	65-45.96W	2.43
0978	44-37.83N	65-45.96W	2.63
0799	44-37.84N	65-45.80W	5.36
0800	44-37.84N	65-45.80W	4.47
0801	44-37.75N	65-45.72W	10.35
0802	44-37.76N	65-45.70W	18.98
0803	44-37.76N	65-45.70W	3.51
0804	44-37.76N	65-45.70W	4.61
0805	44-37.73N	65-45.52W	3.89
0806	44-37.73N	65-45.52W	12.19
0807	44-37.77N	65-45.51W	4.25
0808	44-37.76N	65-45.53W	0.95
0809	44-37.50N	65-45.22W	36.43
0810	44-37.58N	66-45.22W	48.62
0811	44-37.59N	65-45.23W	2.06
0812	44-37.59N	65-45.24W	1.36
0813	44-37.59N	65-45.25W	3.92
0814	44-37.60N	65-45.27W	8.01
0815	44-37.60N	65-45.28W	1.74
0816	44-37.60N	65-45.30W	2.04
0817	44-37.53N	65-45.33W	12.29
0818	44-37.52N	66-45.32W	15.17
0819	44-37.52N	65-45.32W	4.55
0820	44-37.51N	65-45.31W	4.04
0821	44-37.51N	65-45.31W	4.47
0822	44-37.51N	65-45.31W	2.04

VALUES = 26

MINIMUM = 0.95	MAXIMUM = 48.62	RANGE = 47.67
AVERAGE = 8.48	STD DEV = 11.14	STDERR = 2.19
VARIANCE = 124.15	SKEWNESS = 2.37	KURTOSIS = 5.09


65°45.70'W
44°38.00'N
N
DIGBY
HARBOUR
44°37.50'N
65°45.00'W


65°46.00'W
44°38.00'N
DIGBY
HARBOUR
44°36.90'N
65°44.00'W

METEGHAN, Nova Scotia

The major industries at Meteghan (population 760 in 1976) include the St. Mary's Bay Fisheries fish plant and wood and metal fabrication facilities. Sediments in the area are predominantly sand/ silt, and are considered to be contaminated by oil to levels as high as 500 ppm. This location is frequently dredged.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0823			5.06
0824			6.99
0825			8.01
0826			13.47
0827			18.21
0828			10.39
0829			33.07
0830			30.65
0831			13.84
0832			17.24
0833			32.99
0834			20.12

VALUES = 12

MINIMUM = 5.06	MAXIMUM = 33.07	RANGE = 28.01
AVERAGE = 17.51	STD DEV = 10.0	STDERR = 2.88
VARIANCE = 99.84	SKEWNESS = 0.45	KURTOSIS = -1.38

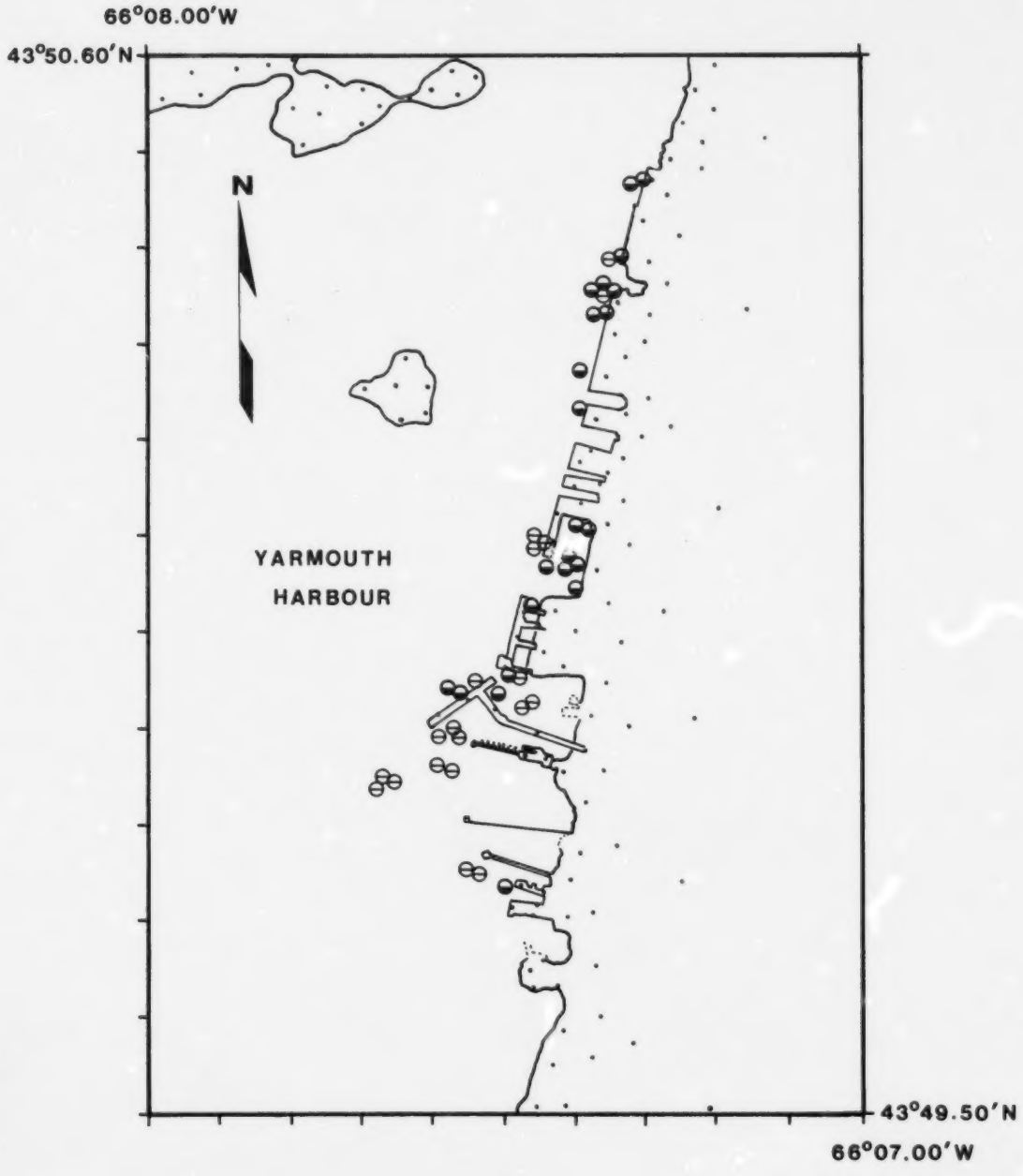
YARMOUTH, Nova Scotia

The predominant industries in Yarmouth (population 7800 in 1976) include Kennebec Fisheries, Sweeny Laurence Fisheries, Brannen Ames and Sons, Dominion Textiles and CN Marine. The sediments in the harbour (sand/ silt/ clay) have been reported to be contaminated by oil (187 to 1050 ppm).

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0835	43-49.89N	66-07.60W	8.57
0836	43-49.90N	66-07.58W	7.88
0837	43-49.89N	66-07.56W	4.08
0838	43-49.86N	66-07.57W	5.44
0839	43-49.87N	66-07.60W	2.28
0840	43-49.85N	66-07.65W	3.39
0841	43-49.85N	66-07.65W	3.43
0842	43-49.84N	66-07.67W	1.11
0843	43-49.74N	66-07.50W	13.62
0844	43-49.76N	66-07.54W	3.76
0845	43-49.76N	66-07.54W	6.27
0846	43-49.94N	66-07.56W	16.16
0847	43-49.94N	66-07.56W	25.45
0848	43-49.95N	66-07.53W	5.58
0849	43-49.94N	66-07.51W	12.78
0850	43-49.93N	66-07.47W	7.53
0851	43-49.93N	66-07.47W	7.87
0852	43-49.96N	66-07.48W	14.49
0853	43-49.96N	66-07.48W	4.11
0854	43-50.03N	66-07.47W	25.14
0855	43-50.05N	66-07.40W	15.04
0856	43-50.07N	66-07.40W	47.39
0857	43-50.07N	66-07.40W	17.22
0858	43-50.07N	66-07.40W	15.79
0859	43-50.11N	66-07.39W	47.49
0860	43-50.11N	66-07.39W	22.41
0861	43-50.07N	66-07.44W	13.04
0862	43-50.09N	66-07.45W	9.93
0863	43-50.09N	66-07.45W	8.35
0864	43-50.09N	66-07.45W	9.90
0865	43-50.24N	66-07.39W	11.26
0866	45-50.28N	66-07.39W	11.64
0867	43-50.34N	66-07.36W	14.49
0868	43-50.34N	66-07.36W	12.13
0869	43-50.36N	66-07.35W	13.91
0870	43-50.36N	66-07.35W	10.28
0871	43-50.36N	66-07.35W	7.11
0872	43-50.36N	66-07.35W	10.08
0873	43-50.39N	66-07.33W	8.04
0874	43-50.39N	66-07.33W	15.36
0875	43-50.47N	66-07.31W	13.52
0876	43-50.47N	66-07.31W	14.80

VALUES = 42

MINIMUM = 1.11	MAXIMUM = 47.49	RANGE = 46.38
AVERAGE = 12.57	STD DEV = 9.72	STDERR = 1.50
VARIANCE = 94.52	SKEWNESS = 2.13	KURTOSIS = 5.23


66°08.00'W
43°50.60'N
N
YARMOUTH
HARBOUR
43°49.50'N
66°07.00'W

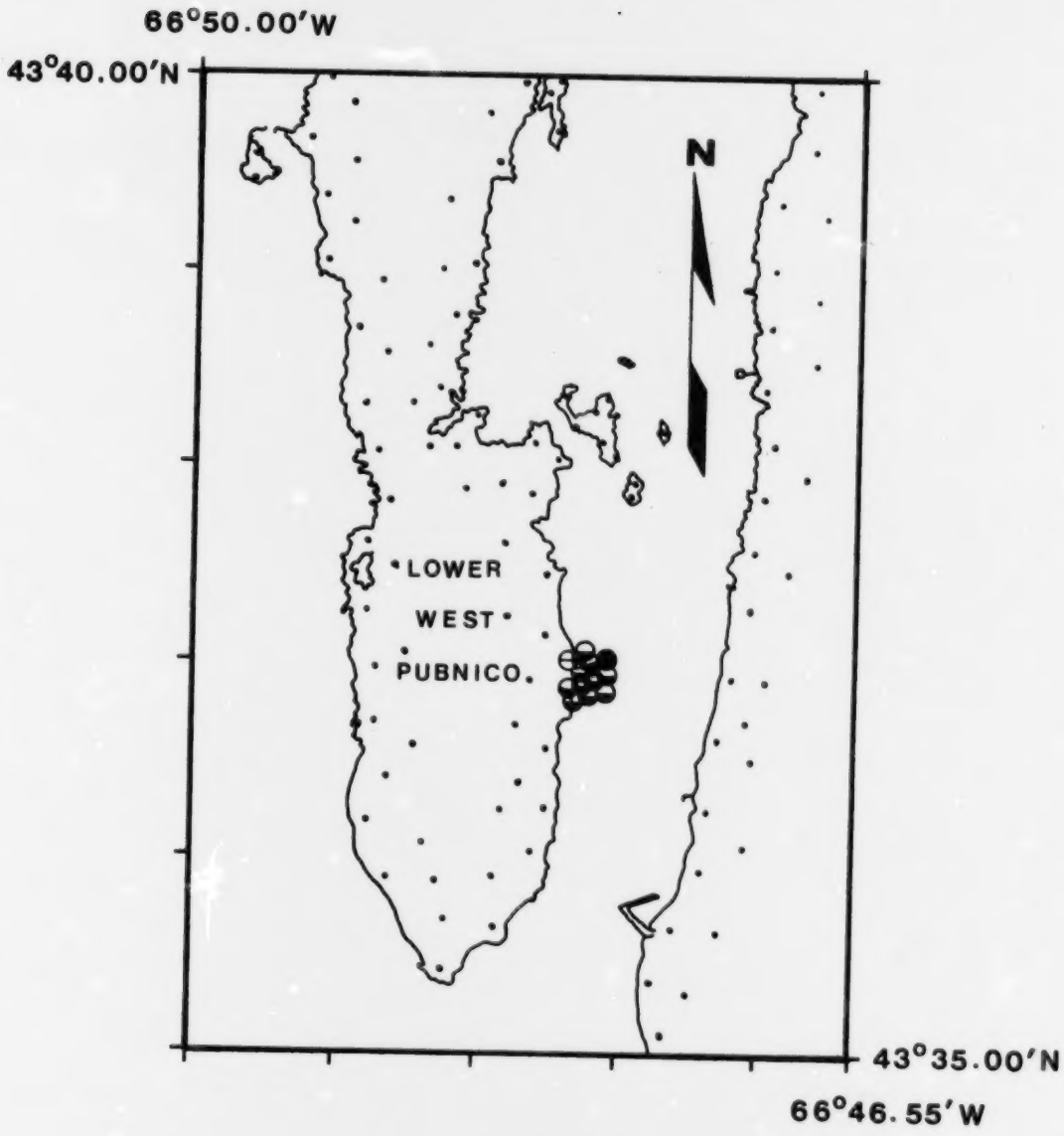
LOWER WEST PUBNICO, Nova Scotia

Fishing and fish processing are the primary industries of Pubnico. The companies which have operations there include Sealife Fisheries, Inshore Fisheries, Connors Bros., Walter D. Surette, Marine Colloids, and Genu Products. The population of the area is approximately 2000. There is no history available on dredging activity in Pubnico.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0877	43-36.94N	65-47.20W	19.58
0878	43-36.94N	65-47.20W	38.64
0879	43-36.97N	65-47.20W	36.87
0880	43-36.97N	65-47.20W	37.63
0881	43-36.93N	65-47.25W	49.74
0882	43-36.93N	65-47.25W	20.45
0883	43-37.00N	65-47.19W	219.00
0884	43-36.99N	65-47.22W	41.53
0885	43-36.99N	65-47.22W	12.10
0886	43-36.98N	65-47.30W	88.84
0887	43-36.98N	65-47.30W	50.11
0888	43-37.00N	65-47.31W	2.62

VALUES = 12

MINIMUM = 2.62	MAXIMUM = 219.0	RANGE = 216.38
AVERAGE = 51.43	STD DEV = 57.25	STDERR = 16.53
VARIANCE = 3277.4	SKEWNESS = 2.00	KURTOSIS = 3.21


66°50.00'W
43°40.00'N
N
LOWER
WEST
PUBNICO
43°35.00'N
66°46.55'W

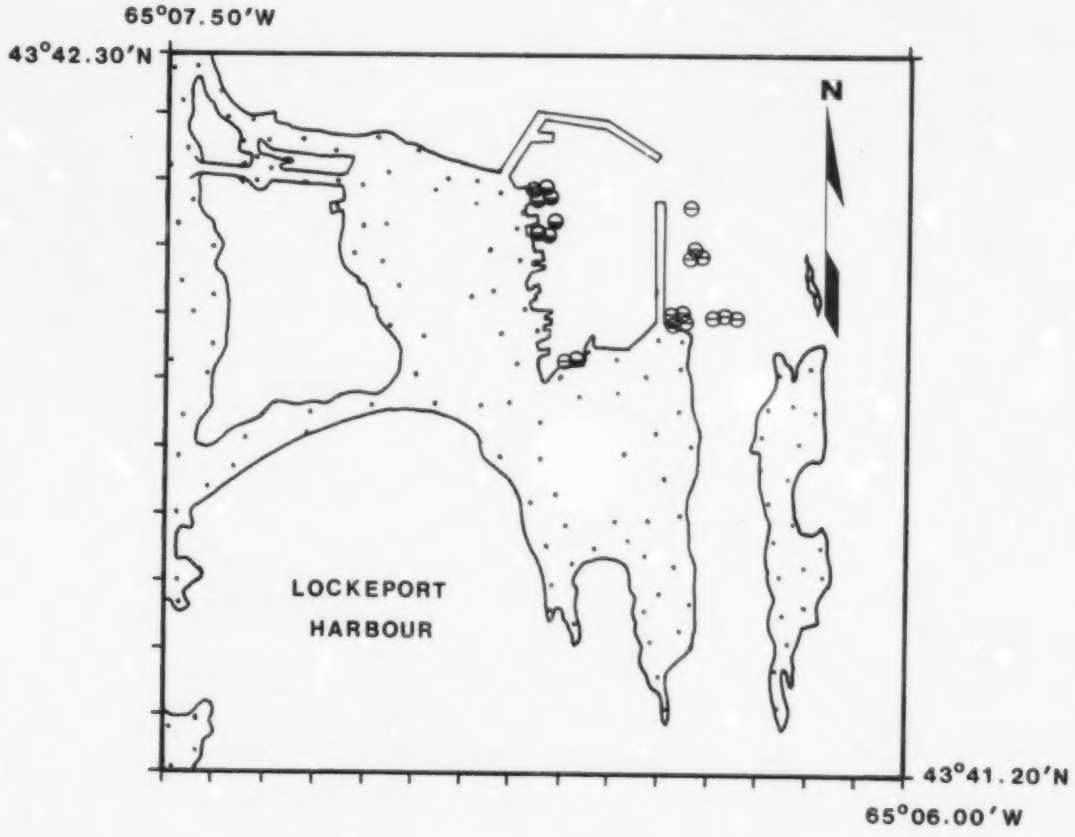
LOCKEPORT, Nova Scotia

Fish processing is the main industry in Lockeport (population 1000). There are 7 private, and 3 Government wharfs situated in this town which supports 4 fish processing plants. There is no dredging history available for this area.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0889	43-42.00N	65-06.44W	2.30
0890	43-42.00N	65-06.44W	2.15
0891	43-42.00N	65-06.44W	2.65
0892	43-42.07N	65-06.45W	1.40
0893	43-41.90N	65-06.36W	3.31
0894	43-41.90N	65-06.38W	2.34
0895	43-41.90N	65-06.40W	1.88
0896	43-41.89N	65-06.48W	3.26
0897	43-41.89N	65-06.48W	2.49
0898	43-41.90N	65-06.48W	4.14
0899	43-41.90N	65-06.48W	2.28
0900	43-41.82N	65-06.69W	8.42
0901	43-41.83N	65-06.69W	16.54
0902	43-42.03N	65-06.74W	74.93
0903	43-42.03N	65-06.74W	14.82
0904	43-42.04N	65-06.72W	68.43
0905	43-42.09N	65-06.76W	53.44
0906	43-42.09N	65-06.76W	38.56
0907	43-42.09N	65-06.76W	17.29
0908	43-42.09N	65-06.76W	19.65

VALUES = 20

MINIMUM = 1.40	MAXIMUM = 74.93	RANGE = 73.53
AVERAGE = 17.01	STD DEV = 23.14	STDERR = 5.18
VARIANCE = 535.66	SKEWNESS = 1.43	KURTOSIS = 0.61


65°07.50'W
43°42.30'N
N
LOCKEPORT
HARBOUR
43°41.20'N
65°06.00'W

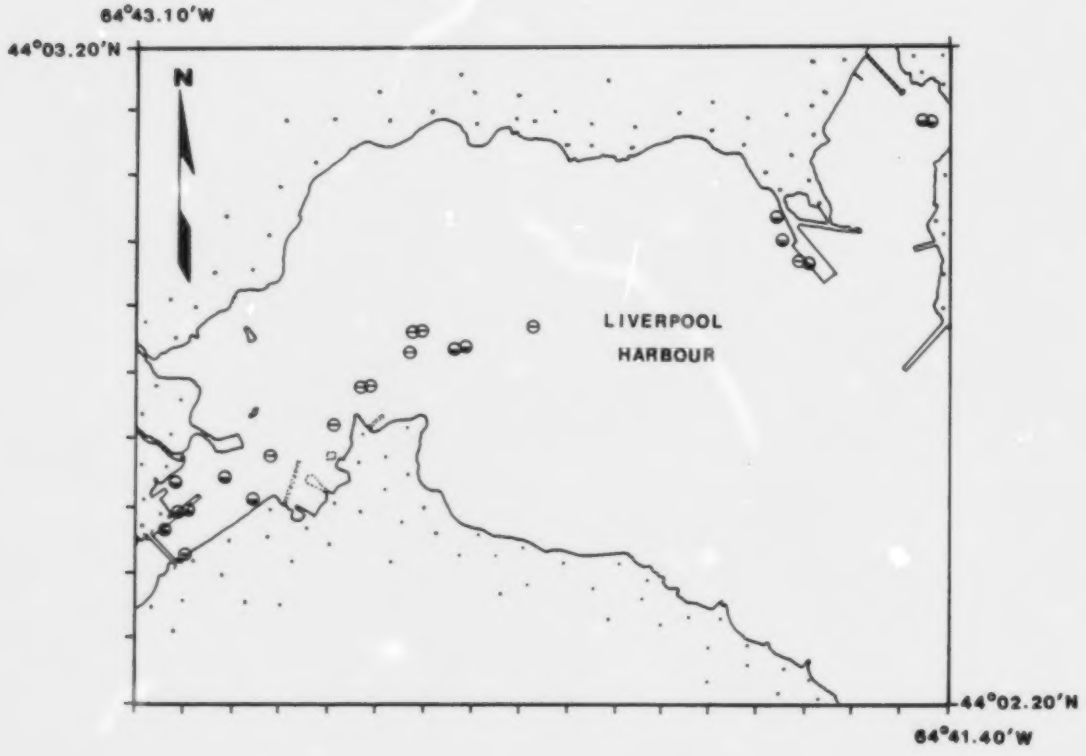
LIVERPOOL, Nova Scotia

Liverpool (population 3340 in 1976), situated at the mouth of the Mersey River, is an industrial center (fish processing plants, pulp and paper mills, and shipyards). The town is an active port with military as well as fisheries operations. The Bowater Mersey Paper Co. (pulp and paper mill) is located across the bay in the town of Brooklyn. The sand/clay sediments from the bay are reported to be oil contaminated at levels ranging from 2 to 6100 ppm. This site is frequently dredged.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0909	44-02.45N	64-43.04W	21.78
0910	44-02.49N	64-43.00W	15.77
0911	44-02.49N	64-43.00W	13.35
0912	44-02.54N	64-42.91W	13.22
0913	44-02.57N	64-42.81W	4.11
0914	44-02.62N	64-42.69W	4.98
0915	44-02.68N	64-42.62W	3.74
0916	44-02.68N	64-42.62W	2.97
0917	44-02.73N	64-42.53W	4.14
0918	44-02.74N	64-42.43W	12.06
0919	44-02.74N	64-42.43W	10.35
0920	44-02.77N	64-42.28W	2.97
0921	44-02.76N	64-41.51W	3.23
0922	44-02.76N	64-41.51W	4.12
0923	44-03.08N	64-41.45W	61.52
0924	44-03.08N	64-41.45W	31.77
0925	44-02.94N	64-41.65W	37.40
0926	44-02.91N	64-41.64W	24.18
0927	44-02.87N	64-41.69W	20.31
0928	44-02.87N	64-41.69W	9.47
0929	44-02.51N	64-42.85W	11.68
0930	44-02.53N	64-43.01W	26.02
0931	44-02.43N	64-42.99W	8.99

VALUES = 23

MINIMUM = 2.97	MAXIMUM = 61.52	RANGE = 58.55
AVERAGE = 15.14	STD DEV = 14.06	STDERR = 2.93
VARIANCE = 197.78	SKEWNESS = 1.65	KURTOSIS = 2.68


64°43.10'W
44°03.20'N
N
LIVERPOOL
HARBOUR
44°02.20'N
64°41.40'W

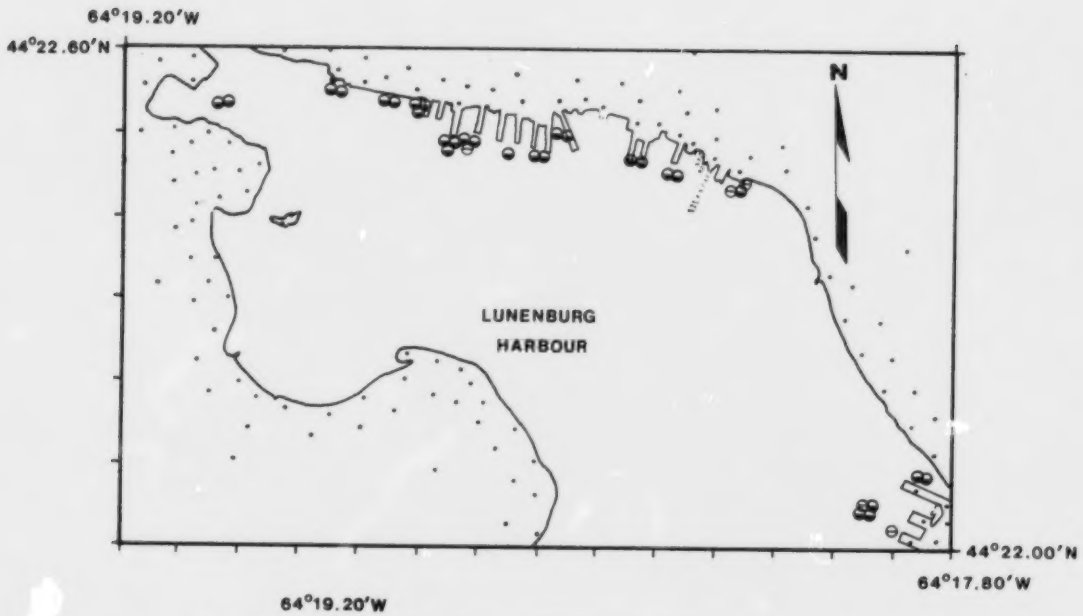
LUNENBURG, Nova Scotia

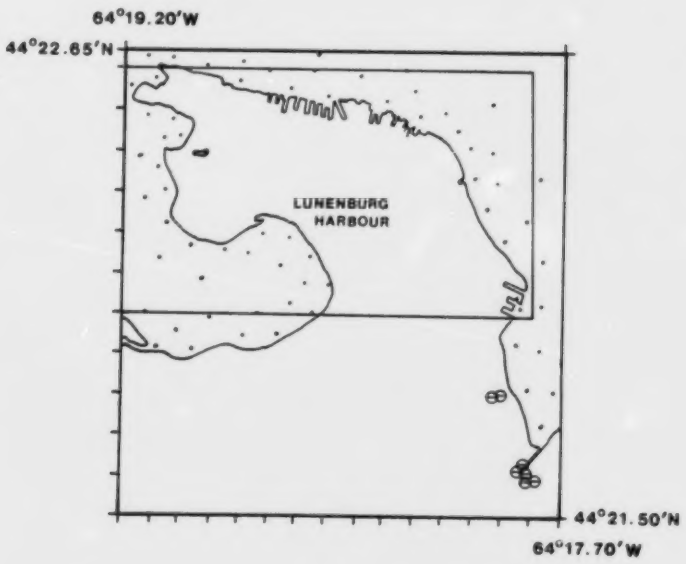
Lunenburg (population 3000 in 1976) is situated on the north side of the harbour. This port is the headquarters for a large Banks fishing fleet; thus, associated fish processing facilities and shipyards are located in the region. No previous dredging history of the harbour is available.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0932	44-21.59N	64-17.80W	1.45
0933	44-21.59N	64-17.80W	2.86
0934	44-21.61N	64-17.82W	2.87
0935	44-21.61N	64-17.82W	5.20
0936	44-21.61N	64-17.82W	1.97
0937	44-21.81N	64-17.91W	6.81
0938	44-21.81N	64-17.91W	5.28
0939	44-22.03N	64-17.90W	5.62
0940	44-22.09N	64-17.85W	47.16
0941	44-22.09N	64-17.85W	47.10
0942	44-22.05N	64-17.94W	11.36
0943	44-22.05N	64-17.94W	42.35
0944	44-22.05N	64-17.94W	15.09
0945	44-22.05N	64-17.94W	9.39
0946	44-22.44N	64-18.15W	4.44
0947	44-22.43N	64-18.16W	7.69
0948	44-22.43N	64-18.16W	23.01
0949	44-22.45N	64-18.27W	30.80
0950	44-22.45N	64-18.27W	47.00
0951	44-22.47N	64-18.34W	20.69
0952	44-22.47N	64-18.34W	20.78
0953	44-22.50N	64-18.45W	56.59
0954	44-22.50N	64-18.45W	53.88
0955	44-22.47N	64-18.50W	24.40
0956	44-22.47N	64-18.50W	26.78
0957	44-22.48N	64-18.55W	21.71
0958	44-22.49N	64-18.62W	72.70
0959	44-22.49N	64-18.62W	58.57
0960	44-22.49N	64-18.62W	1.38
0961	44-22.48N	64-18.65W	10.80
0962	44-22.48N	64-18.65W	12.65
0963	44-22.48N	64-18.65W	14.35
0964	44-22.54N	64-18.70W	27.64
0965	44-22.54N	64-18.70W	36.43
0966	44-22.54N	64-18.70W	11.54
0967	44-22.54N	64-18.75W	21.48
0968	44-22.54N	64-18.75W	21.39
0969	44-22.55N	64-18.84W	18.45
0970	44-22.55N	64-18.84W	17.65
0971	44-22.53N	64-19.03W	47.82
0972	44-22.53N	64-19.03W	58.26

VALUES = 41

MINIMUM = 1.38	MAXIMUM = 72.70	RANGE = 71.28
AVERAGE = 23.74	STD DEV = 19.31	STDERR = 3.02
VARIANCE = 372.96	SKEWNESS = 0.77	KURTOSIS = -0.57


64°19.20'W
44°22.60'N
N
LUNENBURG
HARBOUR
44°22.00'N
64°17.80'W

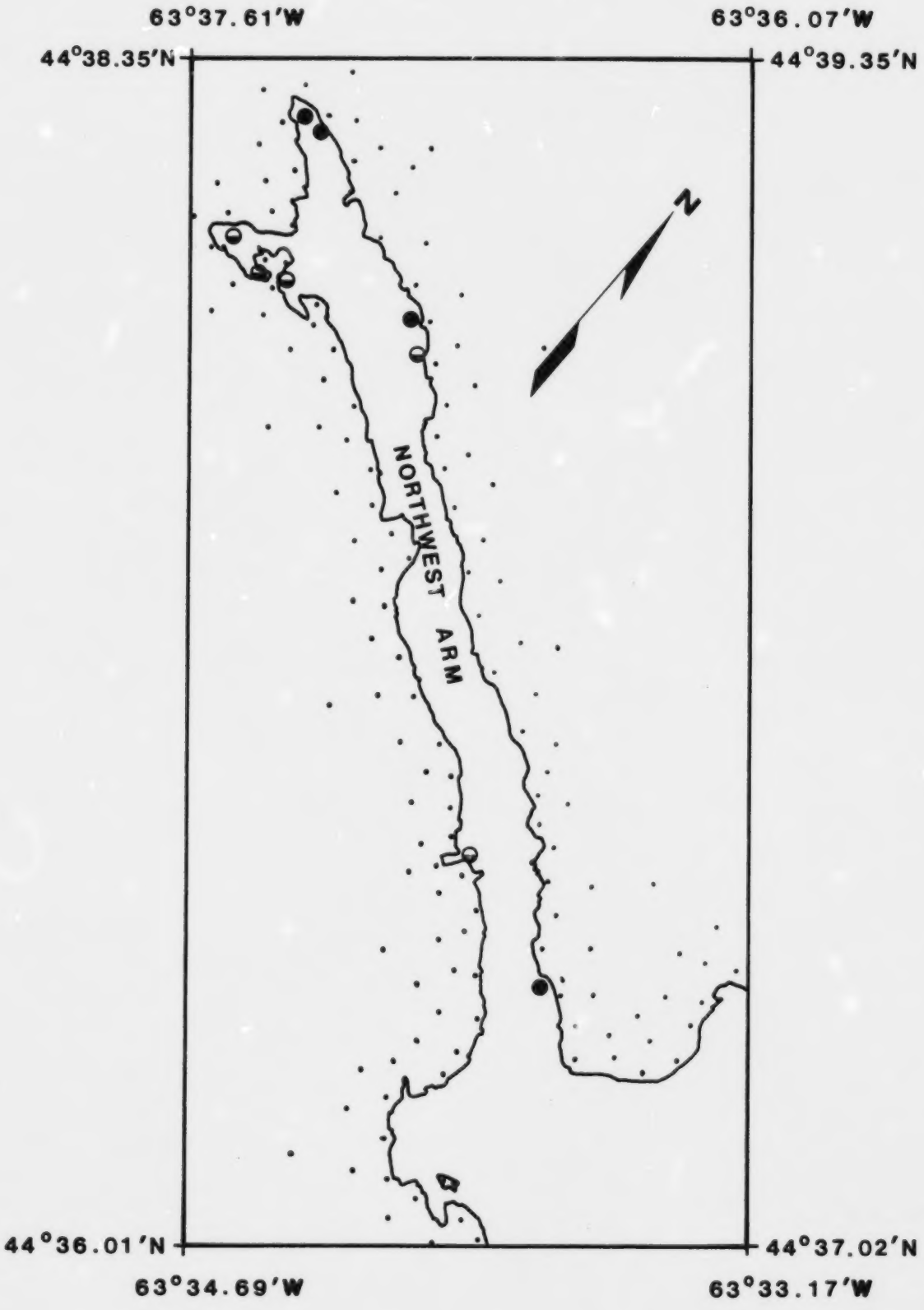

64°19.20'W
44°22.65'N
LUNENBURG
HARBOUR
44°21.50'N
64°17.70'W

NORTHWEST ARM - HALIFAX, Nova Scotia

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0973	44-38.44N	63-37.13W	194.60
0974	44-38.44N	63-37.05W	160.00
0975	44-38.08N	63-37.05W	17.29
0976	44-38.08N	63-36.88W	64.92
0977	44-38.08N	63-36.81W	10.93
0978	44-38.27N	63-36.48W	193.30
0979	44-38.17N	63-36.24W	93.20
0980	44-37.28N	63-34.88W	13.98
0981	44-37.15N	63-34.38W	165.70

VALUES = 9

MINIMUM = 10.93	MAXIMUM = 194.6	RANGE = 183.67
AVERAGE = 101.5	STD DEV = 78.26	STDERR = 26.09
VARIANCE = 6124.96	SKEWNESS = -0.01	KURTOSIS = -1.96


63°37.61'W
63°36.07'W
44°38.35'N
44°39.35'N
N
NORTHWEST ARM
44°36.01'N
44°37.02'N
63°34.69'W
63°33.17'W

HALIFAX HARBOUR, Nova Scotia

The city of Halifax (population 268000 in 1976) is situated on the west side of the harbour approximately 8 miles NNW of Chebuc Head. The port of Halifax is a terminus for continental railways and a year-round port of call for both conventional as well as bulk container ships. Numerous industries are located within the region.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
0982	44-37.61N	63-33.64W	15.52
0983	44-37.90N	63-33.98W	11.47
0984	44-38.49N	63-34.02W	134.50
0985	44-38.53N	63-34.03W	8.72
0986	44-38.58N	63-34.06W	101.30
0987	44-38.67N	63-34.10W	12.09
0988	44-38.67N	63-34.10W	376.50
0989	44-38.67N	63-34.10W	21.24
0990	44-38.84N	63-34.15W	0.99
0991	44-38.84N	63-34.15W	126.30
0992	44-38.93N	63-34.22W	7.65
0993	44-39.12N	63-34.45W	100.10
0994	04-39.24N	63-34.60W	101.80
0995	44-39.24N	63-34.60W	3.98
0996	44-39.24N	63-34.60W	117.90
0997	44-39.32N	63-34.73W	108.70
0998			59.25
0999	44-39.51N	63-34.94W	74.47
1000	44-39.66N	63-35.23W	112.90
1001	44-39.82N	63-35.45W	248.90
1002	44-39.86N	63-33.72W	165.50
1003	44-39.86N	63-33.72W	142.10
1004	44-39.86N	63-33.72W	2.92
1005	44-39.86N	63-33.72W	158.00
1006	44-39.87N	63-33.87W	48.21
1007	44-39.87N	63-33.87W	2.66
1008	44-39.75N	63-33.52W	63.26
1009	44-40.03N	63-35.66W	22.63
1010	44-40.19N	63-35.95W	103.20
1011	44-40.28N	63-36.00W	16.08
1012	44-40.43N	63-36.17W	78.29

VALUES = 31

MINIMUM = 0.99 MAXIMUM = 376.5 RANGE = 375.51
AVERAGE = 82.17 STD DEV = 82.50 STDERR = 14.82
VARIANCE = 6806.90 SKEWNESS = 1.56 KURTOSIS = 3.08

BEDFORD BASIN, Nova Scotia

The town of Bedford is located at the head of Bedford Bay. The Canadian Armed Forces North Magazine jetty is situated between Roach Cove and Rent Point. The National Gypsum jetty and a Gulf Oil Warf are situated in the vacinity of Wrights Point.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1013	44-40.55N	63-37.11W	96.45
1014	44-40.55N	63-37.11W	127.60
1015	44-40.55N	63-37.11W	125.10
1016	44-41.75N	63-37.02W	9.83
1017	44-42.01N	63-36.70W	4.54
1018	44-42.01N	63-36.70W	8.01
1019	44-41.53N	63-37.11W	12.80
1020	44-40.91N	63-36.86W	
1021	44-40.89N	63-36.83W	2.42
1022	44-40.85N	63-36.74W	96.68
1023	44-40.86N	63-36.68W	7.23
1024	44-40.58N	63-35.89W	1.50
1025	44-40.58N	63-35.89W	74.43

VALUES = 12

MINIMUM = 1.50	MAXIMUM = 127.6	RANGE = 126.1
AVERAGE = 47.21	STD DEV = 52.03	STDERR = 15.02
VARIANCE = 2706.80	SKEWNESS = 0.46	KURTOSIS = -1.74

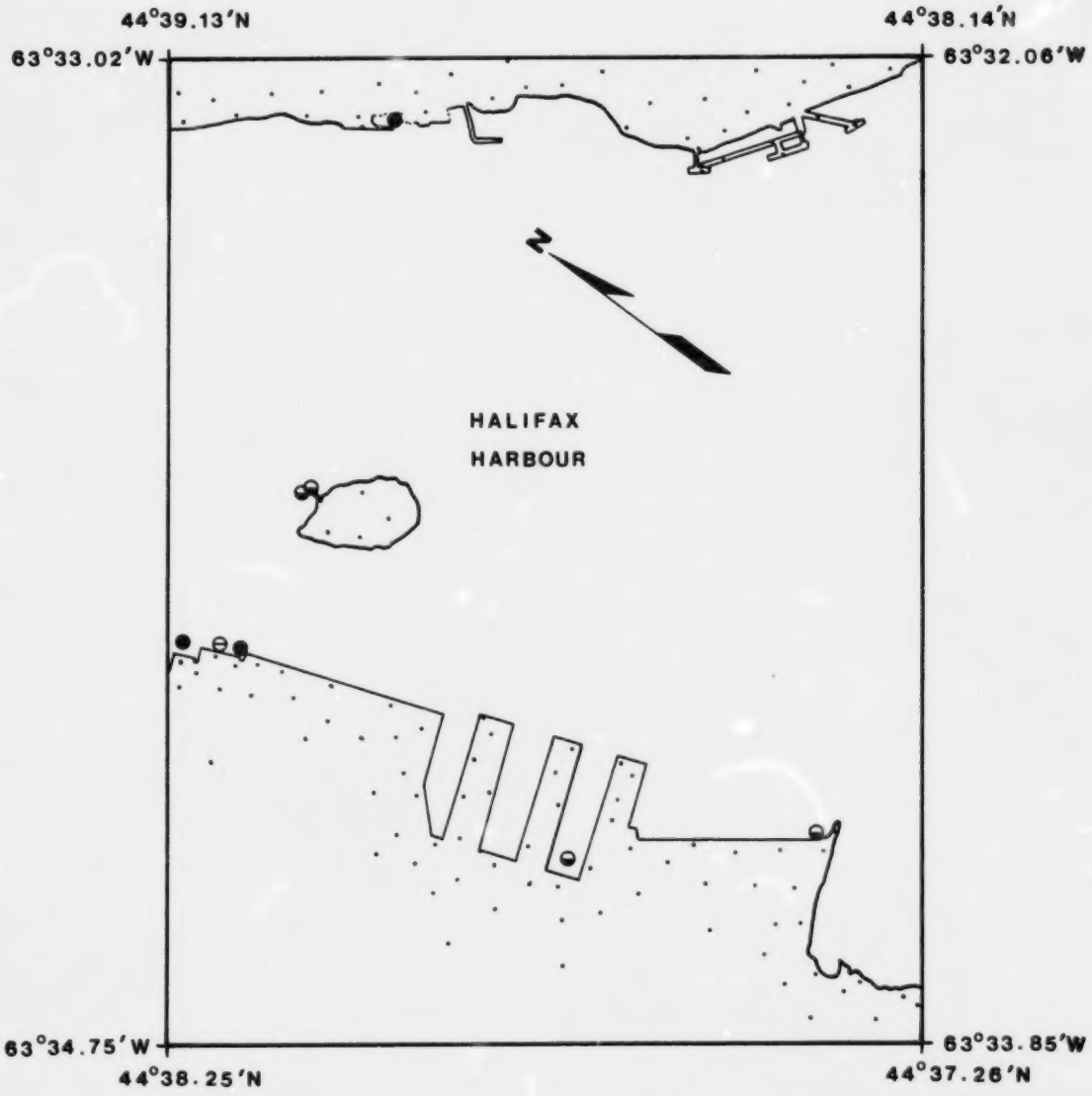
DARTMOUTH, Nova Scotia

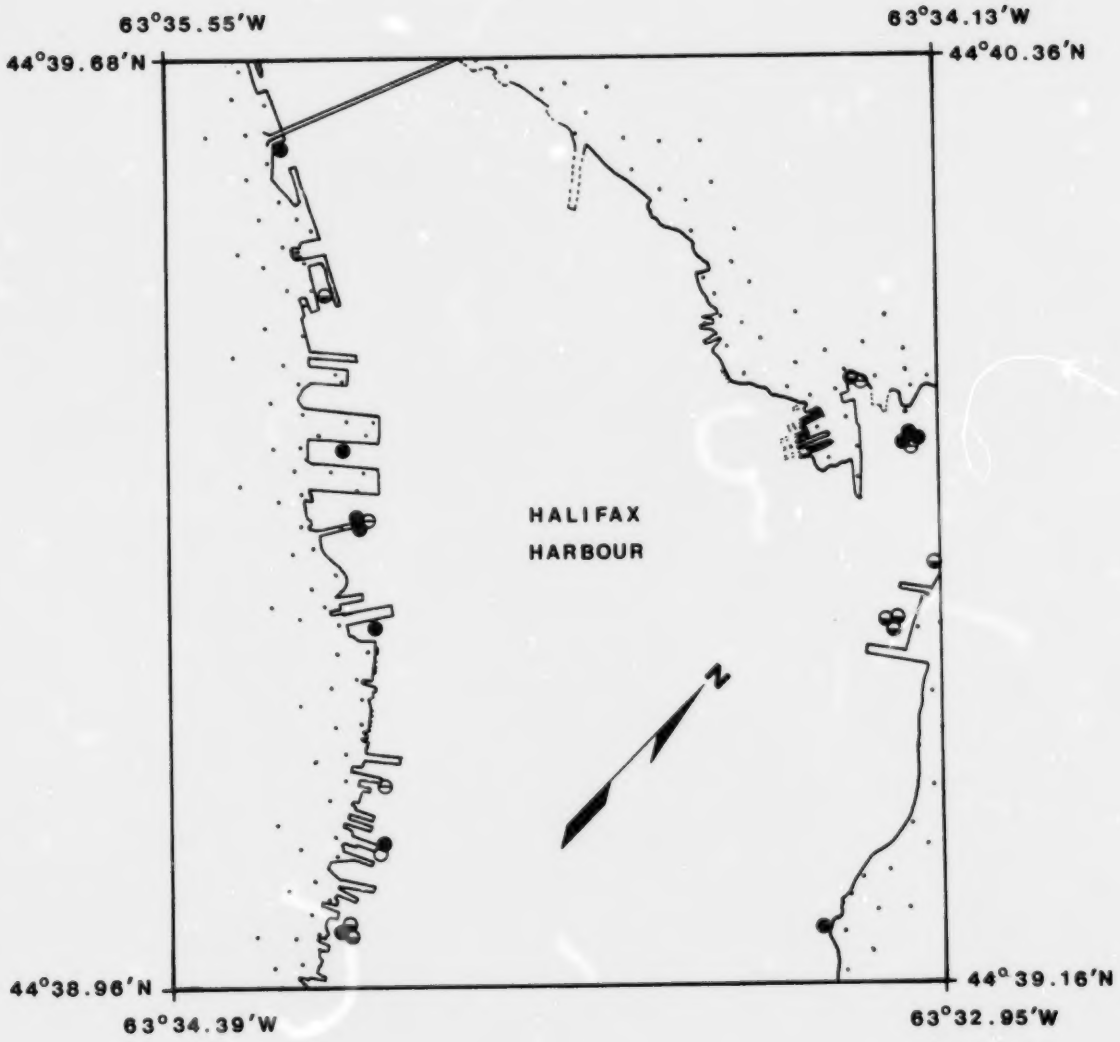
The city of Dartmouth is located across the harbour from Halifax.

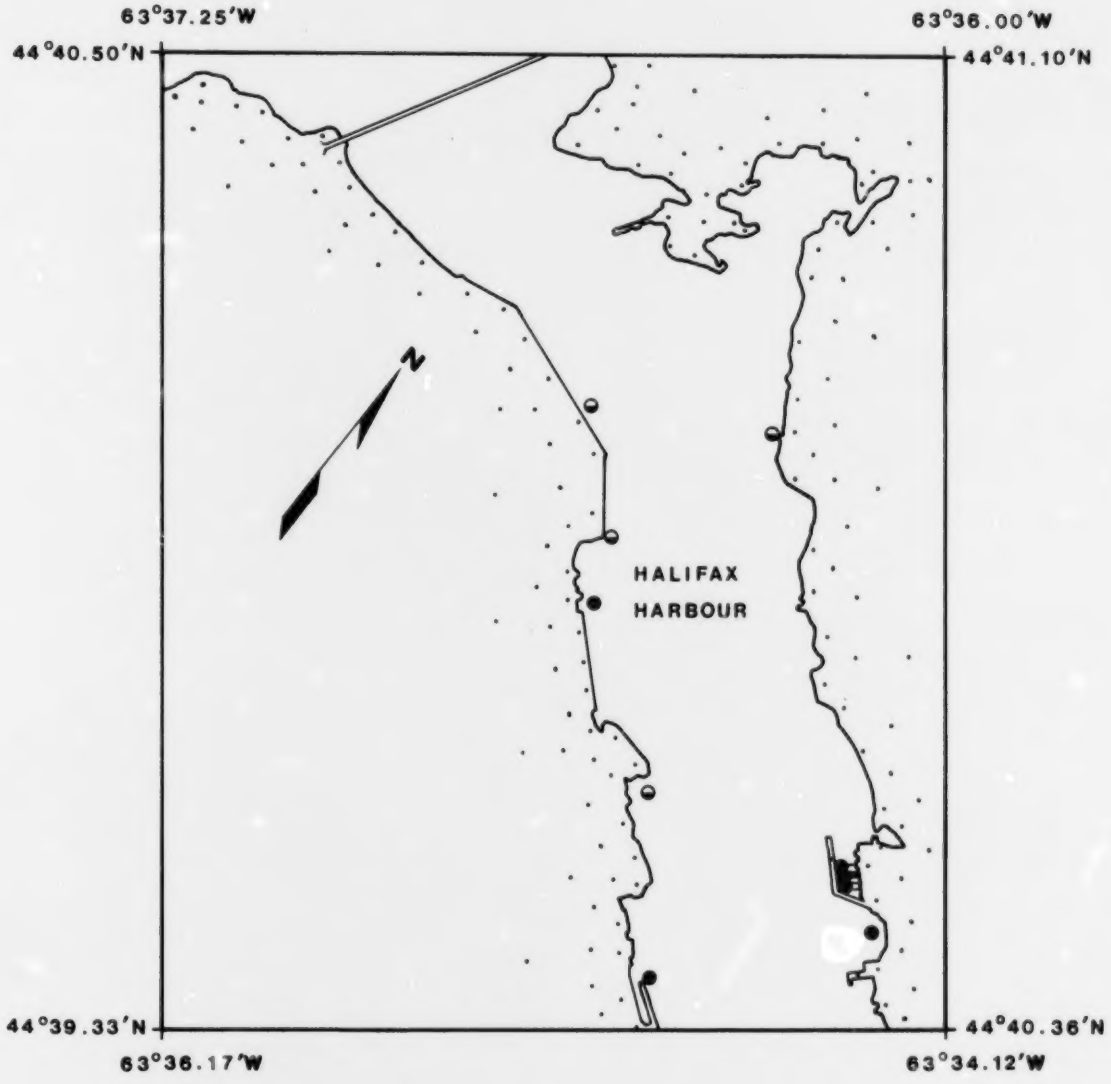
SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1026	44-40.50N	63-35.78W	56.20
1027	44-40.07N	63-35.22W	3.35
1028	44-40.07N	63-35.22W	19.61
1029	44-40.07N	63-35.22W	134.70
1030	44-40.07N	63-35.22W	144.90
1031	44-40.07N	63-35.22W	121.50
1032	44-40.02N	63-35.16W	
1033	44-40.02N	63-35.16W	143.30
1034	44-39.60N	63-33.49W	35.30
1035	44-39.60N	63-33.49W	38.45
1036	44-39.60N	63-33.49W	41.69
1037	44-39.14N	63-33.25W	200.90
1038	44-38.77N	63-32.85W	118.60
1039	44-38.56N	63-33.64W	72.18
1040	44-38.56N	63-33.64W	49.88

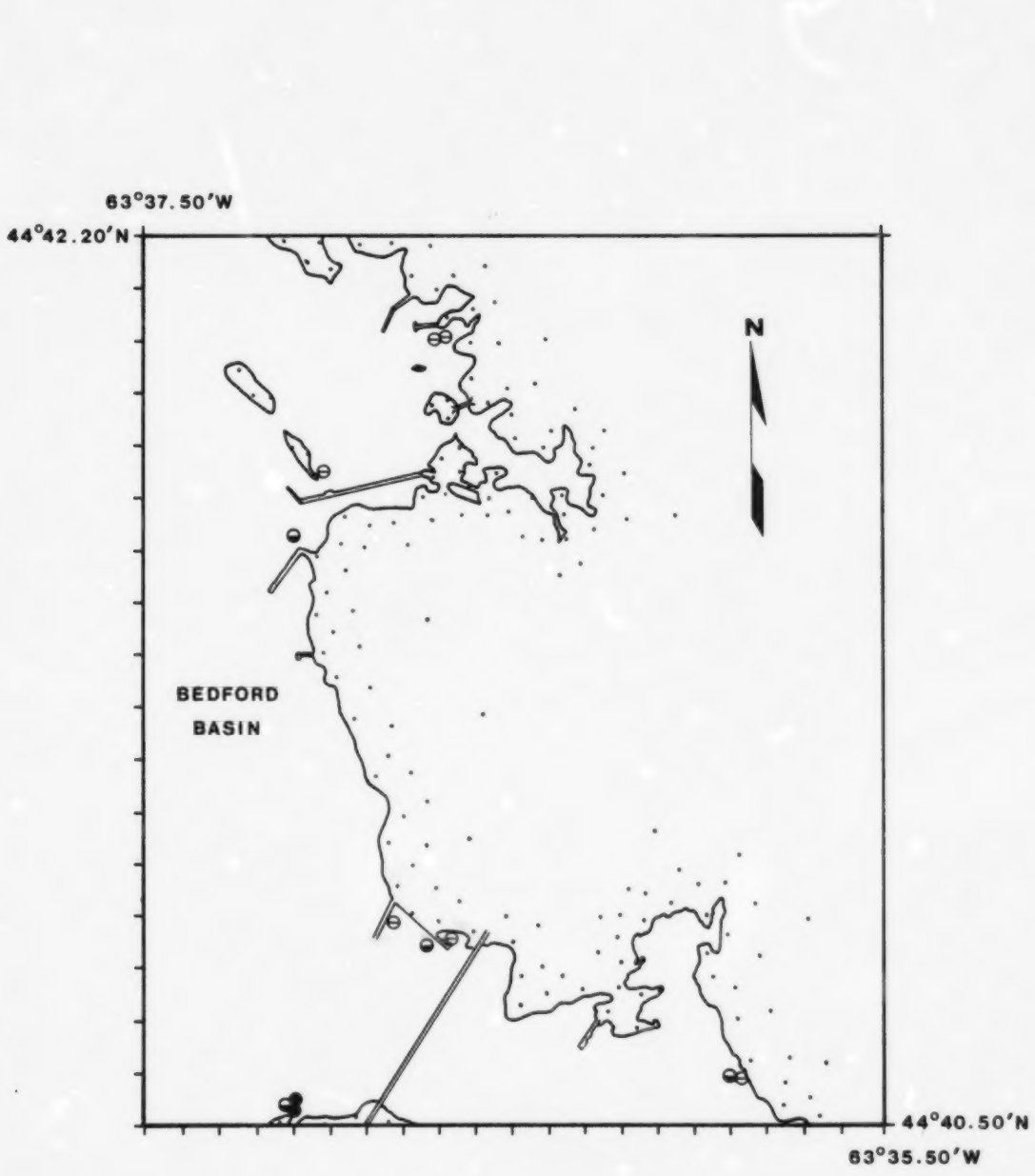
VALUES = 14

MINIMUM = 3.35	MAXIMUM = 200.90	RANGE = 197.55
AVERAGE = 84.34	STD DEV = 58.85	STDERR = 15.73
VARIANCE = 3463.63	SKEWNESS = 0.38	KURTOSIS = -1.24


44°39.13'N
63°33.02'W
44°38.14'N
63°32.06'W
N
HALIFAX
HARBOUR
63°34.75'W
44°38.25'N
63°33.85'W
44°37.26'N


63°35.55'W
63°34.13'W
44°39.68'N
44°40.36'N
HALIFAX
HARBOUR
N
44°38.96'N
44°39.16'N
63°34.39'W
63°32.95'W


63°37.25'W
63°36.00'W
44°40.50'N
44°41.10'N
N
HALIFAX
HARBOUR
44°39.33'N
44°40.36'N
63°36.17'W
63°34.12'W


63°37.50'W
44°42.20'N
N
BEDFORD
BASIN
44°40.50'N
63°35.50'W

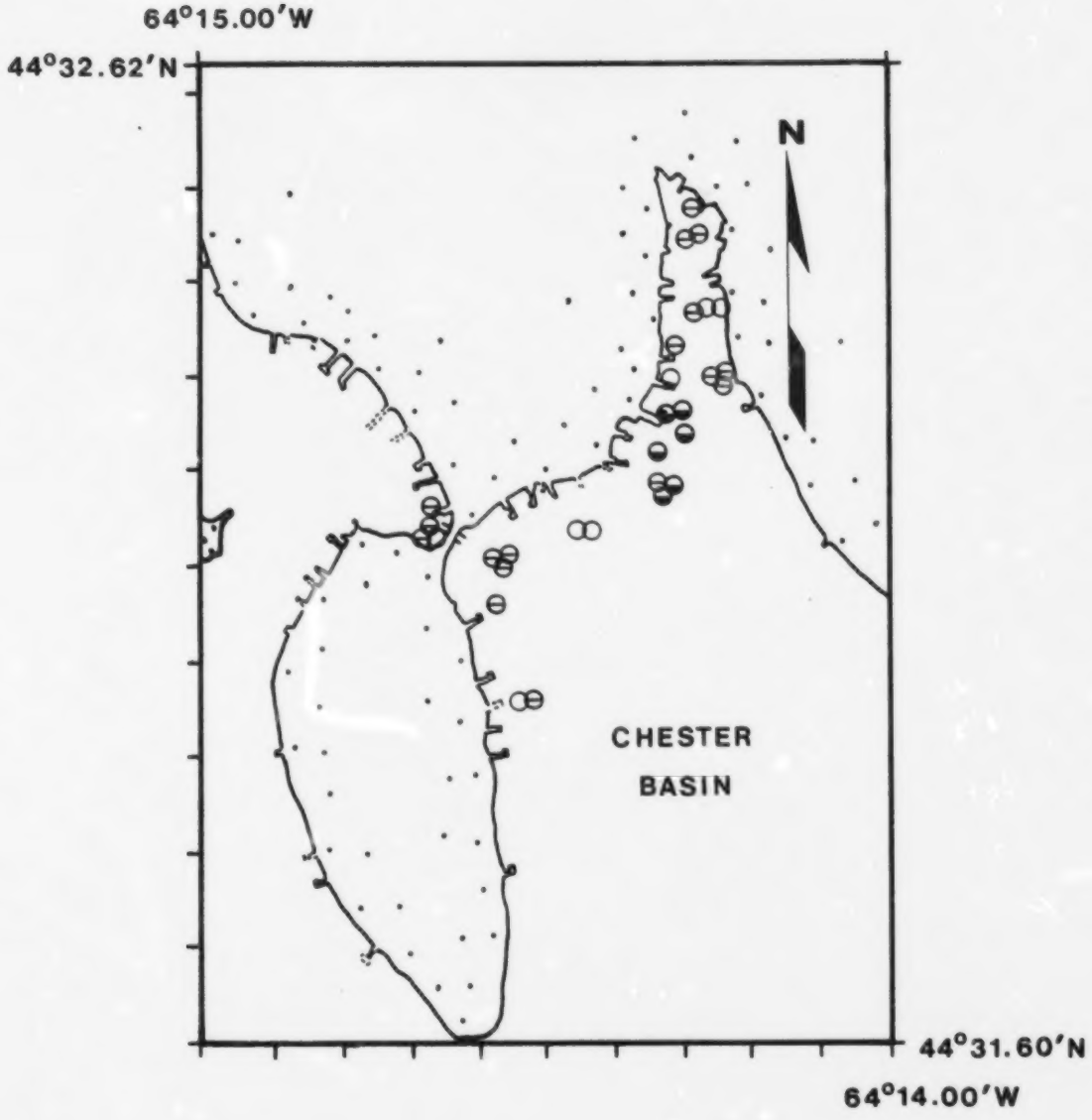
CHESTER, Nova Scotia

Chester (population 1100 in 1976) has two major industries, tourism and fishing. The sediments in the Basin are mainly sand/silt/clay in nature, and are reported to be oil contaminated (1500 to 11900 ppm). This location is not recorded as a frequent dredging site.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1041	44-32.47N	64-14.29W	5.62
1042	44-32.44N	64-14.28W	8.45
1043	44-32.44N	64-14.28W	2.89
1044	44-32.36N	64-14.28W	8.97
1045	44-32.33N	64-14.31W	3.82
1046	44-32.29N	64-14.32W	0.77
1047	44-32.26N	64-14.31W	35.23
1048	44-32.26N	64-14.31W	14.07
1049	44-32.24N	64-14.30W	17.39
1050	44-32.22N	64-14.34W	13.51
1051	44-32.23N	64-14.37W	
1052	44-32.18N	64-14.33W	4.69
1053	44-32.18N	64-14.33W	13.35
1054	44-32.18N	64-14.33W	14.48
1055	44-32.14N	64-14.44W	0.65
1056	44-32.14N	64-14.44W	0.51
1057	44-32.11N	64-14.56W	2.95
1058	44-32.11N	64-14.56W	3.37
1059	44-32.11N	64-14.56W	1.07
1060	44-32.06N	64-14.57W	2.71
1061	44-31.96N	64-14.53W	0.96
1062	44-31.96N	64-14.53W	3.63
1063	44-32.13N	64-14.66W	0.74
1064	44-32.13N	64-14.66W	1.12
1065	44-32.14N	64-14.66W	1.68
1066	44-32.16N	64-14.66W	2.67
1067	44-32.16N	64-14.66W	
1068	44-32.30N	64-14.25W	3.12
1069	44-32.30N	64-14.25W	3.26
1070	44-32.30N	64-14.25W	6.34
1071	44-32.37N	64-14.25W	0.77
1072	44-32.37N	64-14.26W	0.95

VALUES = 30

MINIMUM = 0.51	MAXIMUM = 35.23	RANGE = 34.72
AVERAGE = 6.00	STD DEV = 7.38	STDERR = 1.35
VARIANCE = 54.52	SKEWNESS = 2.23	KURTOSIS = 5.64


64°15.00'W
44°32.62'N
N
CHESTER
BASIN
44°31.60'N
64°14.00'W

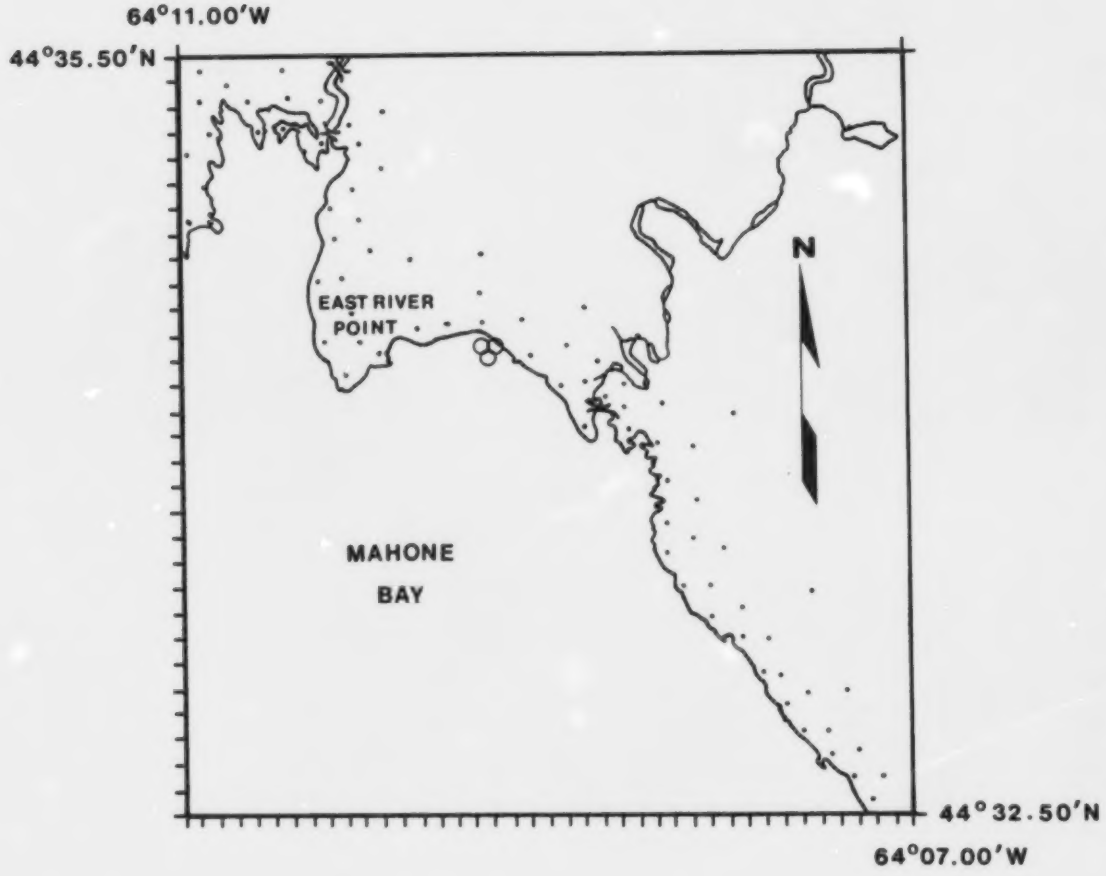
EAST RIVER POINT BEACH, Nova Scotia

East River Point is located on Mahone Bay, 3.8 miles NNW of Upper Blandford.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1073	44-34.34N	64-09.21W	0.36
1074	44-34.34N	64-09.21W	0.73
1075	44-34.34N	64-09.21W	0.40

VALUES = 3

AVERAGE = 0.50 STD DEV = 0.20


64°11.00'W
44°35.50'N
EAST RIVER
POINT
N
MAHONE
BAY
44°32.50'N
64°07.00'W

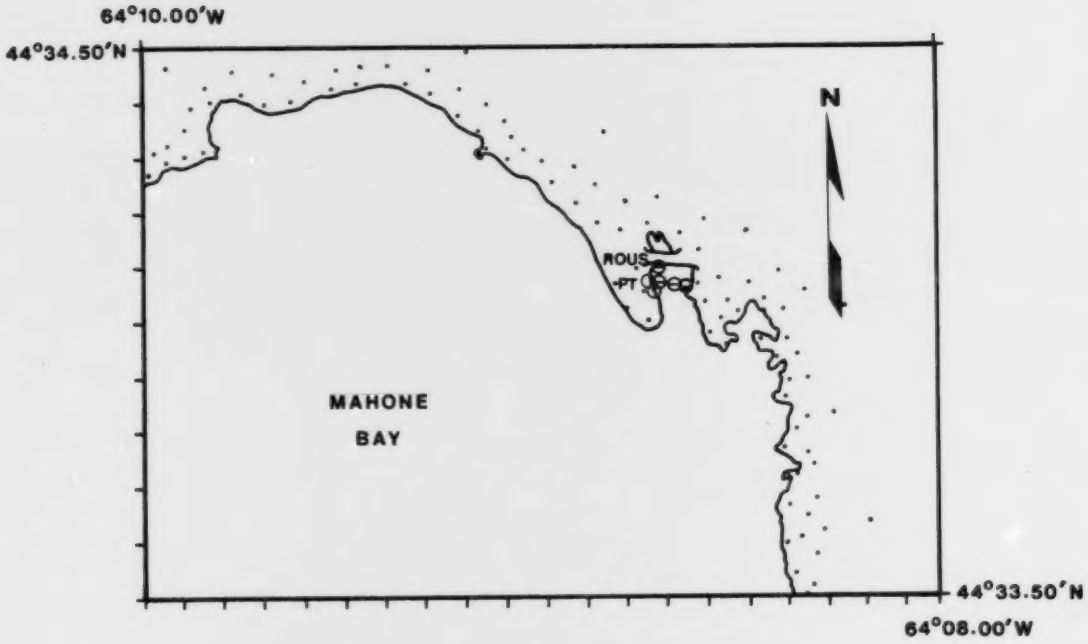
ROUS POINT, Nova Scotia

The Masonite Canada plant (formerly Anil), discharges its industrial effluent into Mahone Bay at Rous Point (population 300).

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1076	44-34.10N	64-08.72W	2.46
1077	44-34.07N	64-08.73W	0.32
1078	44-34.07N	64-08.73W	0.53
1079	44-34.07N	64-08.73W	1.21
1080	44-34.07N	64-08.68W	4.51
1081	44-34.07N	64-08.68W	20.00

VALUES = 4

MINIMUM = 0.32	MAXIMUM = 20.00	RANGE = 19.68
AVERAGE = 4.84	STD DEV = 7.59	STDERR = 3.10
VARIANCE = 57.56	SKEWNESS = 1.24	KURTOSIS = -0.29


64°10.00'W
44°34.50'N
N
MAHONE
BAY
44°33.50'N
64°08.00'W

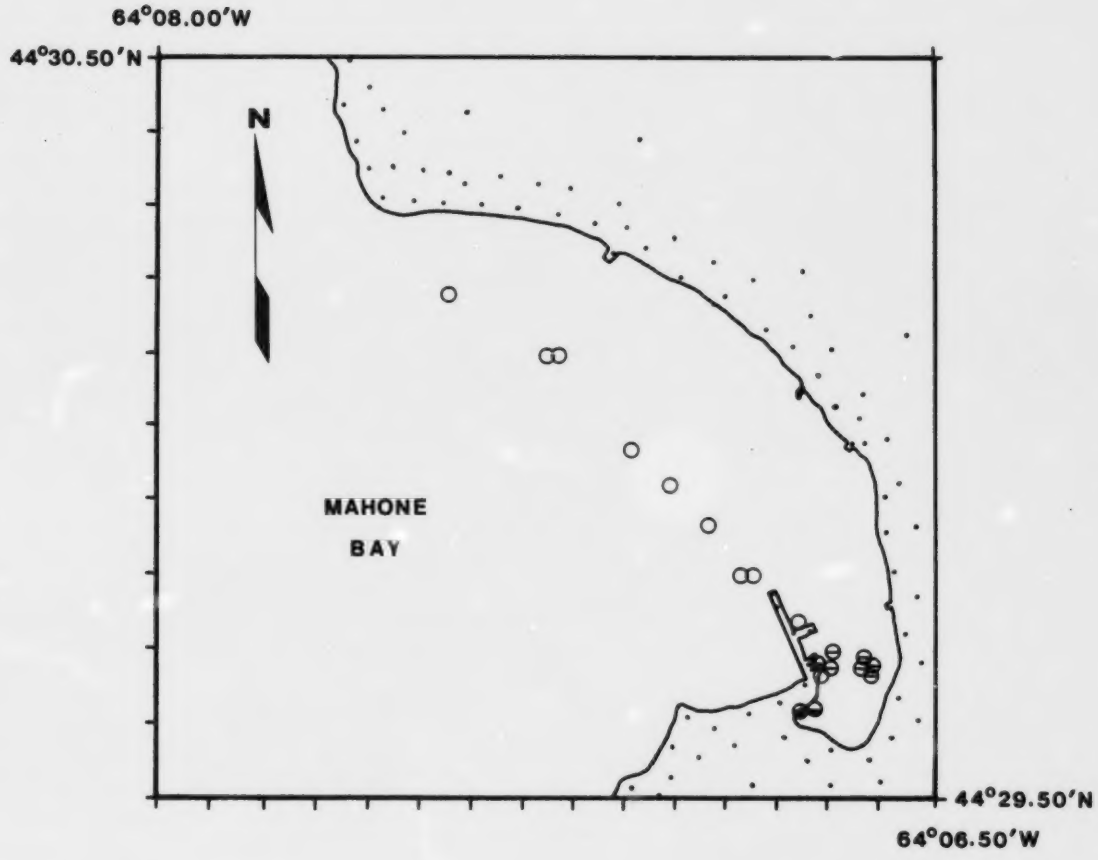
BLANDFORD HEAD, Nova Scotia

Fish processing facilities are located at Blandford Head, site of a former whaling plant. Predominantly sand/silt/clay sediments from the region contain oil at concentrations of approximately 1300 ppm.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1082	44-29.63N	64-06.75W	20.67
1083	44-29.63N	64-06.75W	17.25
1084	44-29.70N	64-06.69W	9.15
1085	44-29.74N	64-06.75W	0.77
1086	44-29.80N	64-06.85W	0.29
1087	44-29.80N	64-06.85W	0.41
1088	44-29.87N	64-06.93W	0.21
1089	44-29.92N	64-07.00W	0.78
1090	44-29.97N	64-07.08W	0.23
1091	44-30.10N	64-07.24W	0.31
1092	44-30.10N	64-07.24W	0.22
1093	44-30.18N	64-07.44W	0.19
1094	44-29.68N	64-06.74W	2.85
1095	44-29.68N	64-06.74W	
1096	44-29.68N	64-06.74W	1.37
1097	44-29.68N	64-06.74W	0.58
1098	44-29.68N	64-06.62W	1.93
1099	44-29.68N	64-06.62W	7.08
1100	44-29.68N	64-06.62W	6.47
1101	44-29.68N	64-06.62W	7.39

VALUES = 19

MINIMUM = 0.19	MAXIMUM = 20.67	RANGE = 20.48
AVERAGE = 4.13	STD DEV = 6.01	STDERR = 1.38
VARIANCE = 36.08	SKEWNESS = 1.57	KURTOSIS = 1.36


64°08.00'W
44°30.50'N
N
MAHONE
BAY
44°29.50'N
64°06.50'W

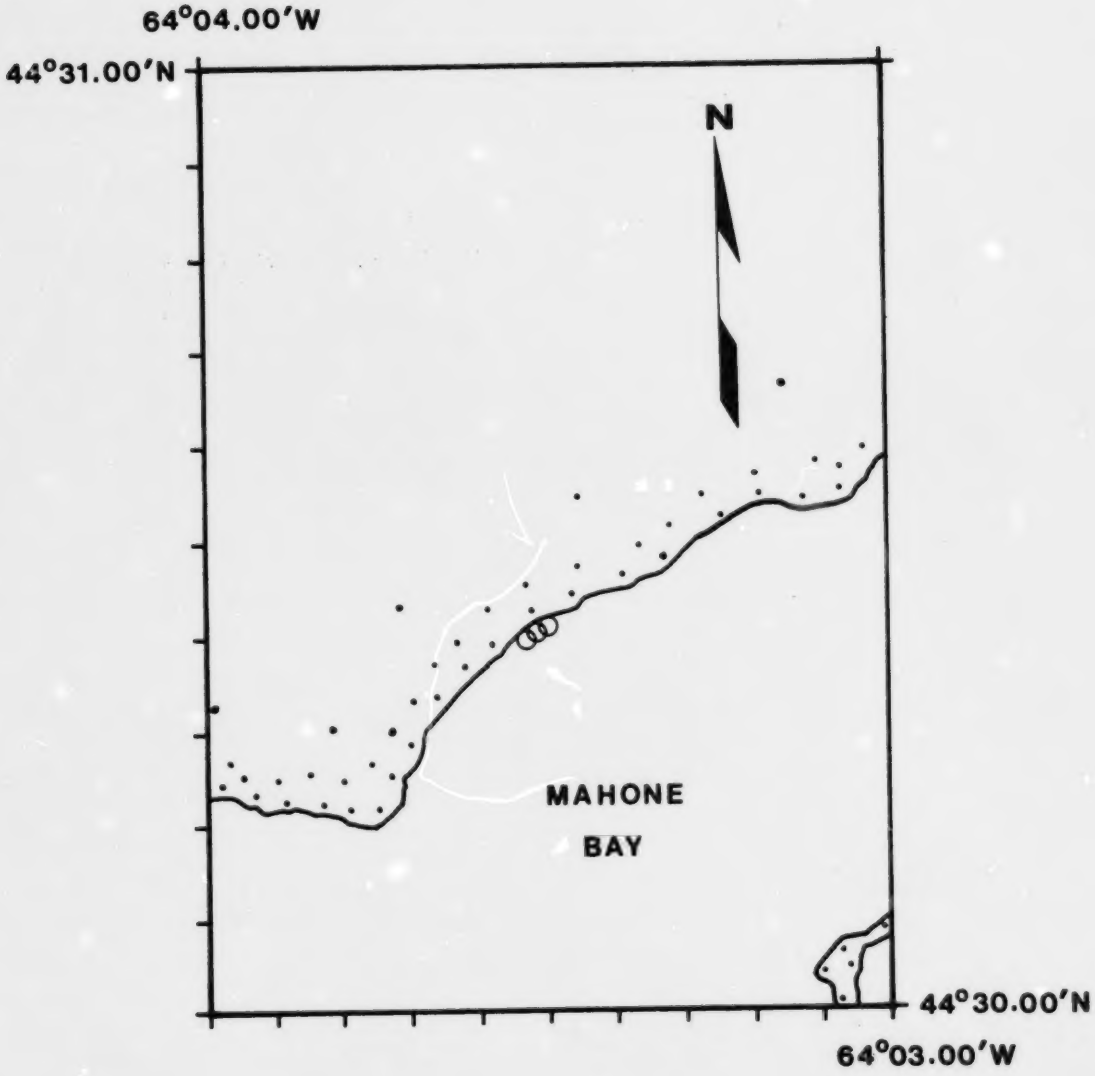
BAYSWATER BEACH, Nova Scotia

This locality has very litle residential development and no industry. This beach is a summer bathing beach.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1102	44-30.40N	64-03.52W	0.22
1103	44-30.40N	64-03.52W	0.56
1104	44-34.40N	64-03.52W	0.39

VALUES = 3

AVERAGE = 0.39 STD DEV = 0.17


64°04.00'W
44°31.00'N
N
MAHONE
BAY
44°30.00'N
64°03.00'W

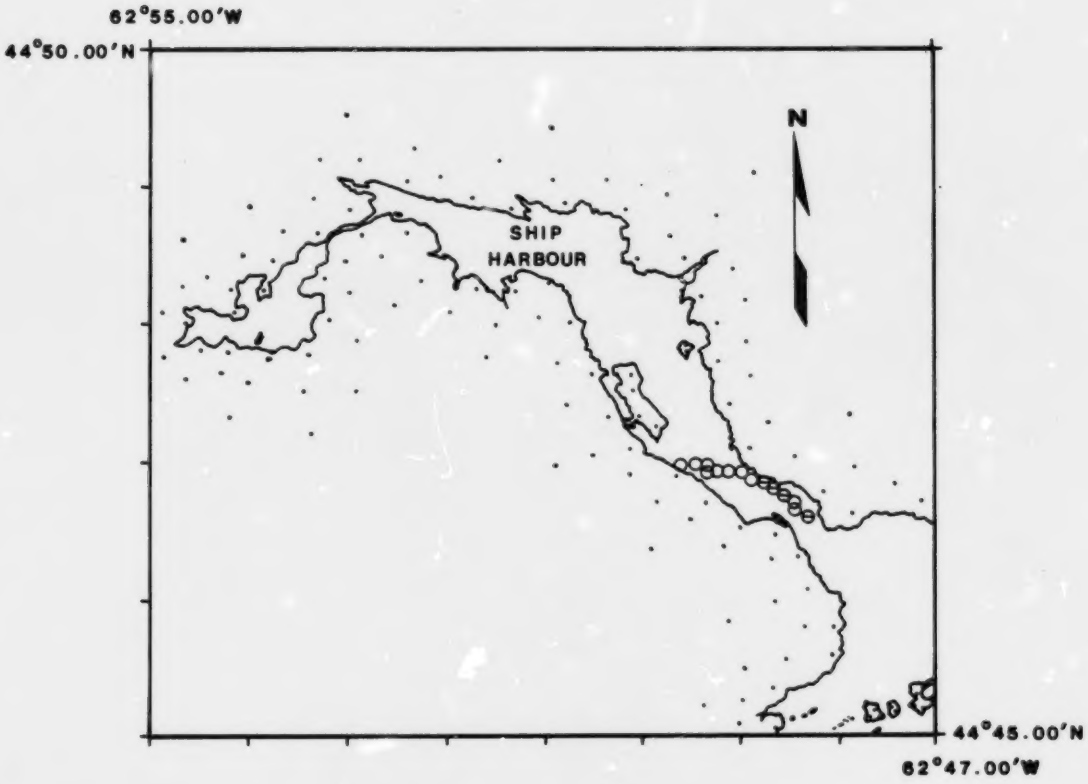
SHIP HARBOUR, Nova Scotia

The majority of the residents in Ship Harbour (population 300) commute to Halifax and Dartmouth to work. Some residents remain to fish, but there are no other industries. There is no available dredging history.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1105	44-46.99N	62-49.59W	0.93
1106	44-46.96N	62-49.40W	0.84
1107	44-46.96N	62-49.29W	0.63
1108	44-46.96N	62-49.29W	0.74
1109	44-46.93N	62-49.20W	0.24
1110	44-46.93N	62-49.10W	0.36
1111	44-46.93N	62-48.98W	0.49
1112			
1113	44-46.90N	62-48.85W	0.91
1114	44-46.85N	62-48.70W	1.57
1115	44-46.80N	62-48.70W	5.82
1116	44-46.75N	62-48.60W	1.16
1117	44-46.73N	62-48.50W	0.47
1118	44-46.73N	62-48.50W	0.61
1119	44-46.66N	62-48.38W	1.05

VALUES = 14

MINIMUM = 0.24	MAXIMUM = 5.82	RANGE = 5.58
AVERAGE = 1.14	STD DEV = 1.39	STDERR = 0.37
VARIANCE = 1.94	SKEWNESS = 2.67	KURTOSIS = 6.17


62°55.00'W
44°50.00'N
N
SHIP
HARBOUR
44°45.00'N
62°47.00'W

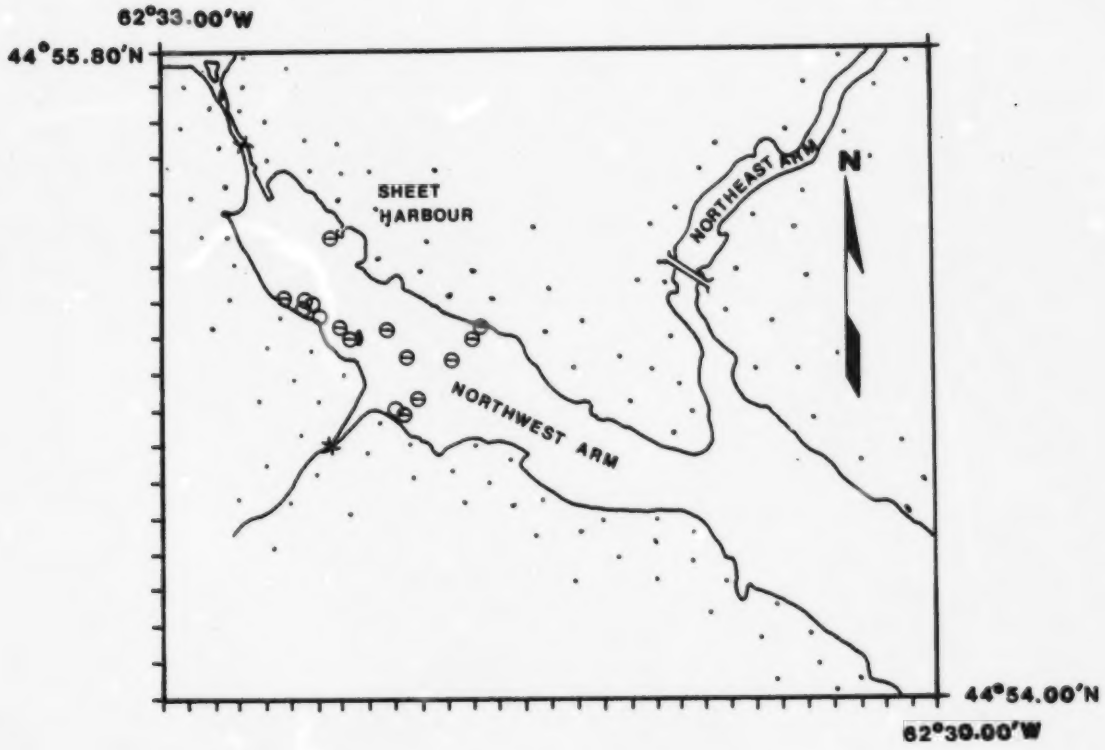
SHEET HARBOUR, Nova Scotia

Sheet Harbour (population 760 in 1976) is primarily a residential district. Although some residents are supported by the fishing industry; fish processing facilities are not present in the town. There is no data on previous dredging activity in the immediate region. All samples were towed samples.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1120	44-55.27N	62-32.32W	5.04
1121	44-55.10N	62-32.52W	3.13
1122	44-55.07N	62-32.45W	0.47
1123	44-55.07N	62-32.45W	0.38
1124	44-55.07N	62-32.45W	0.74
1125	44-55.05N	62-32.40W	0.35
1126	44-55.03N	62-32.31W	1.72
1127	44-55.00N	62-32.28W	3.39
1128	44-55.02N	62-32.12W	2.30
1129	44-54.94N	62-32.05W	1.41
1130	44-55.04N	62-31.77W	2.13
1131	44-54.78N	62-32.05W	2.32
1132	44-54.78N	62-32.05W	0.83
1133	44-54.83N	62-32.02W	1.84
1134	44-54.94N	62-31.88W	2.27
1135	44-54.99N	62-31.79W	3.48

VALUES = 16

MINIMUM = 0.35	MAXIMUM = 5.04	RANGE = 4.69
AVERAGE = 1.99	STD DEV = 1.32	STDERR = 0.33
VARIANCE = 1.73	SKEWNESS = 0.56	KURTOSIS = -0.49


62°33.00'W
44°55.80'N
SHEET HARBOUR
NORTHEAST ARM
N
NORTHWEST ARM
44°54.00'N
62°30.00'W

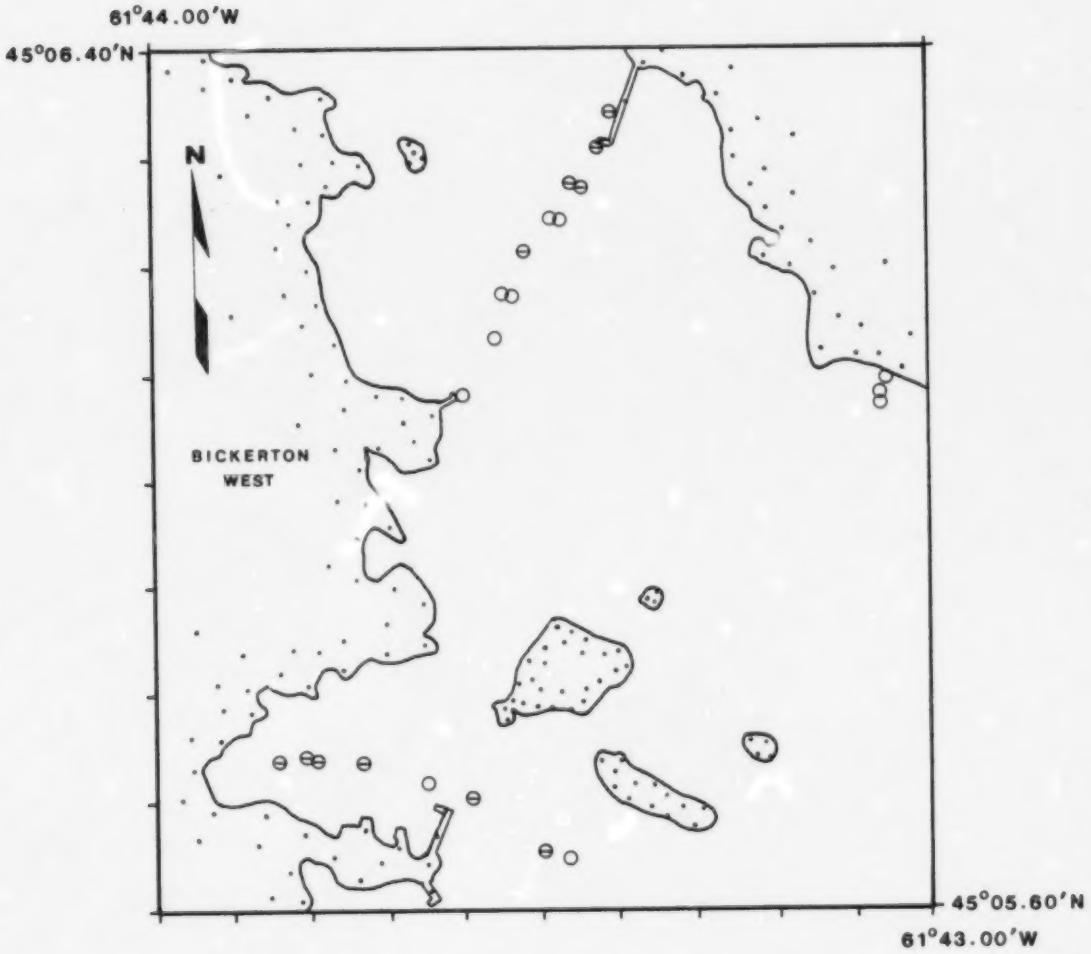
PORT BICKERTON, Nova Scotia

The only industry in Port Bickerton (population 150 in 1976) is a fish plant which produces fish oil among other products. The shoal area at the approaches between Bickerton Island and Barachois Head has been dredged. The sediments are reported to be sand/ silt, and are not reported to be oil contaminated.

SAMPLE NUMBER	LATITUDE	LONGITUDE	PETROLEUM RESIDUE
1136	45-05.65N	61-43.46W	0.27
1137	45-05.66N	61-43.49W	1.68
1138	45-05.67N	61-43.53W	
1139	45-05.71N	61-43.58W	5.99
1140	45-05.72N	61-43.64W	0.65
1141	45-05.74N	61-43.72W	6.68
1142	45-05.74N	61-43.79W	2.91
1143	45-05.74N	61-43.79W	1.71
1144	45-05.74N	61-43.85W	3.11
1145	45-06.08N	61-43.60W	0.64
1146	45-06.13N	61-43.57W	0.67
1147	45-06.17N	61-43.54W	0.54
1148	45-06.17N	61-43.54W	0.45
1149	45-06.21N	61-43.52W	1.55
1150	45-06.24N	61-43.48W	0.70
1151	45-06.24N	61-43.48W	0.51
1152	45-06.27N	61-43.45W	2.37
1153	45-06.27N	61-43.45W	2.13
1154	45-06.31N	61-43.42W	4.98
1155	45-06.34N	61-43.41W	6.42
1156	45-06.07N	61-43.06W	0.27
1157	45-06.08N	61-43.06W	0.45
1158	45-06.09N	61-43.05W	0.20

VALUES = 22

MINIMUM = 0.20	MAXIMUM = 6.68	RANGE = 6.48
AVERAGE = 2.04	STD DEV = 2.12	STDERR = 0.45
VARIANCE = 4.49	SKEWNESS = 1.10	KURTOSIS = -0.25


61°44.00'W
45°06.40'N
N
BICKERTON
WEST
45°05.60'N
61°43.00'W

Field Log Notes

0001 4.0m Behind breakwater by thermal plant discharge, sand + mud.
0002 3.0m Infront of breakwater by thermal plant discharge, sand.
0003 3.0m Adjacent to landfill area, anaerobic bark and pulp waste.
0004 5.0m Across from MOT wharf by land fill area, anaerobic pulp waste.
0005 3.0m Inside end of West Bay breakwater, anaerobic, mud + sand.
0006 1.5m Infront of the CNR station West Bay, sand.
0007 4.0m Next to shoal area infront of Brunswick Mining and Smelting, sand + gravel.
0008 5.5m South side of the Public wharf, mud.
0009 3.0m South of dolphin by Public wharf, mud.
0010 8.0m Along edge of dredged channel, mud.
0011 6.0m 5m off end of N.B. International Paper Co. wharf, mud + fiber.
0012 5.5m Halfway along east side of above wharf, mud.
0013 4.0m West of MOT wharf adjacent to rock filled area, sand + mud.
0014 3.5m Between International Paper Co. and ferry wharf where harbor tugs berth, mud + gravel.
0015 4.5m East side of ferry wharf, mud + gravel
0016 6.5m South of bridge over Nepisiquit River, black, anaerobic unconsolidated sediment.
0017 6.0m Adjacent to footing west end of bridge.
Black-brown anaerobic unconsolidated, sediment.
0018 4.5m 10m offshore from outfall pipe of Consolidated Bathurst, anaerobic pulp waste, highly silt laden water in the immediate vicinity.
0019 4.5m 20m offshore from Consolidated Bathurst wharf, anaerobic sediment.
0020 6.0m 10m offshore from concrete wharf, oil tanker offloading, anaerobic, silty fibrous sediment.
0021 4.0m Government wharf east bank of river, sample mostly pieces of bark from pulp waste.
0022 5.0m North end of government wharf, pulp waste.
0023 6.5m 5m off end of Irving fueling wharf, pulp waste with some silt.
0024 2.0m North side of red spar channel marker, mud and silt.
0025 4.0m 10m offshore from navigational aid beacon, some eelgrass, with visible oil, mud.
0026 2.5m N.E. of black can buoy no. 51B, brown mud.
0027 1.5m Patchy eelgrass bed. Mud.

0028 3.5m Adjacent to Bathurst Yacht Club refueling wharf, mud + fine gravel.
0029 M.I. By marine slip, sandy silt.
0030 6.5m Alongside fish plant unloading area, mud + sand.
0031 7.0m Inside corner Young's Wharf, mud + sand.
0032 5.0m Easterly end of breakwater, mud + sand.
0033 5.5m 100m offshore easterly end of transect, sandy silt.
0034 5.0m 275m from Young's Wharf entrance, sand.
0035 5.0m 200m in from entrance to harbor, sand.
0036 5.5m 50m from outer east corner of wharf, sand.
0037 6.0m 75m from outer edge of wharf, sand.
0038 6.0m 100m from W. end Young's Wharf, sand.
0039 6.0m West of Young's Wharf, sand.
0040 3.0m N.W. corner, new wharf area, sand + shell.
0041 L.I. West of new wharf area, near fish plant outfall, sand.
0042 M.I. Adjacent to fish plant outfall, surface mud removed due to presence of fish offal.
0043 5.0m Eastern tip of Young's Wharf by harbor light, sand.
0044 L.I. Beach east of harbor, sand.
0045 M.I. Same as above.
0046 3.5m Inside corner easterly wharf, mud + sand.
0047 4.0m Halfway along easterly wharf, mud + sand.
0048 H.I. By marine slip, sand + gravel.
0049 7.5m 15m from N.W. corner of wharf, first of transect, clay-mud.
0050 4.0m 350m from wharf possibly eelgrass bed, third of transect, mud.
0051 5.5m Ninth of transect three-quarters across to other shore, mud.
0052 5.0m Tenth of transect, mud and decaying eelgrass.
0053 0.5m Eleventh of transect inshore of extensive eelgrass bed, mud + sand.
0054 L.I. Beach at far side by Savoy Landing, sandy mud.
0055 M.I. Same as above.
0056 H.I. Same as above.
0057 2.5m Alongside wharf at Savoy Landing to west of bridge, sample is mostly eelgrass, some mud + sand.
0058 5.0m S.W. corner of main wharf at Shippegan, mud.
0059 L.I. Beach area between causeway and wharf area, sand.
0060 M.I. Same as above.
0061 H.I. Same as above.
0062 2.0m Sample was from recent dredge material piled onto beach, mostly sand and sandstone. The sample coordinates were position of barge.
0063 H.I. South west of bridge on tidal flat, mostly wood fibre.

0064 M.I. Same as above.
0065 M.I. Wave washed area by ruins, S.W. of bridge, sand and gravel.
0066 H.I. Below west end of Morrissey Bridge, sand and gravel.
0067 M.I. Same as above.
0068 L.I. Same as above.
0069 M.I. Adjacent to Irving Oil Wharf, mostly fine gravel.
0070 H.I. N.E. end of Morrissey Bridge, sand.
0071 M.I. N.E. end of Morrissey Bridge, mostly wood fiber.
0072 L.I. N.E. end of Morrissey Bridge, sand and mud.
0073 H.I. Along side road in area marked " Dumping ground " on chart, sand + gravel.
0074 L.I. Same as above and in sheltered area, sand + gravel.
0075 L.I. Same as above and in wave washed area, gravel.
0076 L.I. S.W. corner of isthmus of Middle Island overlooking the dumping ground, sand + gravel.
0077 L.I. Same as above from a depth of 10 cm, clay.
0078 L.I. Same as above from a depth of 5 cm, clay.
0079 M.I. N.E. of Middle Island in cove by causeway, sand.
0080 L.I. Same as above, sand duplicates.
0081 L.I. Same as above, sand duplicates.
0082 M.I. N.E. of N.B. Electric Power Commission, sand.
0083 L.I. Sand, same as above.
0084 L.I. Sand, same as above.
0085 L.I. S.E. of power plant, adjacent to sewage plant, sand.
0086 M.I. Sand, same as above.
0087 M.I. Sand, same as above.
0088 L.I. N.E. corner of town wharf, clay-sand.
0089 M.I. Same as above, duplicates.
0090 M.I. Same as above, duplicates.
0091 L.I. In cove, behind CNR wharf, sand + gravel.
0092 xxxx Same as above.
0093 M.I. Same as above near storm runoff pipe, sand and wood fiber.
0094 M.I. Below main bridge S.E. end, gravel and sand triplicate.
0095 M.I. Same as above, triplicate.
0096 M.I. Same as above, triplicate.
0097 H.I. Down stream of Aldouane River from bridge, sand.
0098 L.I. Same as above, sand.
0099 L.I. (high subtidal) Same as above, sand.
0100 L.I. By footings of old unused bridge, N.E. of present structure, sand + gravel.
0101 H.I. Mud flat upstream from Daigle Creek Bridge.
0102 L.I. Mud flat with clam bed upstream from bridge, duplicate.

0103 L.I. Same as above, duplicate.
0104 L.I. Alongside causeway, 30m from samples 101 to 103, anaerobic mud.
0105 M.I. Mooneys Creek bridge Route 11 downstream of road, clam bed, mud + sand.
0106 M.I. Clam Bed adjacent to conduits under road.
0107 2.5m Richibucto government wharf, some oil visible in mud.
0108 3.0m Inside government wharf near tidal mud flats.
0109 3.0m Same as above.
0110 2.5m Halfway along inside face of government wharf, gravel, visible traces of oil.
0111 3.0m Along end of government wharf gravel, shells, and eelgrass.
0112 L.I. Sample adjacent to paved roadway, sand.
0113 H.I. Same location, sand.
0114 M.I. Mud flat alongside highway inside the government wharf.
0115 M.I. Clam bed by downstream footing of bridge at Weldon Creek, sand.
0116 L.I. Clam bed, sand on beach 35m from bridge.
0117 M.I. Clam bed, sand on beach 30m from bridge.
0118 M.I. Alongside bridge to Rexton, sand on upstream side.
0119 L.I. Same as above, sand.
0120 L.I. (high subtidal) Same as above, anaerobic sandy-mud.
0121 2.5m East side of government wharf, along wooden section.
0122 2.5m Same as above.
0123 3.0m West side of the government wharf, one-quarter of the way along.
0124 3.0m West side of the government wharf, one-half of the way along.
0125 3.0m Same as above.
0126 3.0m West side of the government wharf, three-quarters of the way along.
0127 4.5m Outside western corner of the government wharf.
0128 7.5m Outside eastern corner of government wharf.
0129 5.0m Inside corner of the government wharf, mud and eelgrass.
0130 2.5m One-half of the way along the eastern side of the government wharf, mud and eelgrass.
0131 2.5m Same as above.
0132 H.I. Along shore adjacent to eastern side of the government wharf.
0133 4.5m Adjacent to mud flats 300m from Canadian Keyes Fiber Co. Ltd., mud.
0134 4.0m One Half the way across to Keyes dumping ground, mud.
0135 3.0m By Keyes outfall (next to dump, clean water), mud.

0136 4.5m 100m from dump and outfall pipe, mud.
0137 3.0m Along front of trash dumping area, mud.
0138 3.0m Beginning of wharf where pulpwood is stacked, slightly anaerobic, darker mud.
0139 6.5m End of wharf with bales of fiber stored in a shed, anaerobic mud.
0140 6.0m Corner of this wharf 10 m from previous sample, mud.
0141 6.0m Halfway along the government wharf, mud not noticably anaerobic.
0142 4.5m Between two wharves, near outfall pipe, no effluent, anaerobic, mud.
0143 5.5m Corner of small wharf, slightly anaerobic with signs of light weight oil on surface of water, mud.
0144 5.5m Same as above.
0145 3.0m Between wharves, mud.
0146 H.I. Sand. 0147 H.I. Mud-sand and Spartina, mud from the surface.
0148 H.I. Surface mud top 5cm, same location as 147.
0149 H.I. Subsurface mud 10-15cm, mud flats by Canadian Gypsum Co. Wharf, same location as 147.
0150 H.I. Sample of clay from below the sand surface along residential area below cliff.
0151 H.I. Sand sample from the same location.
0152 M.I. In tidal creek at the end of Avon Road, upstream from a (sewer) outfall, mud.
0153 M.I. Same as above.
0154 M.I. 50m downstream from outfall pipe, mud.
0155 M.I. Same as above, sample taken from 25 cm below surface.
0156 H.I. Same location, sample taken in marsh grass, 5 cm below the surface, with root material.
0157 H.I. Below church spire and small stream, coarse sand + fine gravel.
0158 L.I. Same as above, coarse sand + fine gravel.
0159 H.I. Same as above, coarse sand + fine gravel.
0160 L.I. Same as above, coarce sand + fine gravel.
0161 H.I. 50m togards government wharf, coarse sand + fine gravel.
0162 L.I. Same as above, coarse sand + gravel.
0163 H.I. High on the beach, 50m towards the wharf,
0164 L.I. 50m towards the wharf, coarse sand + fine gravel.
0165 H.I. Same as above, coarse sand + fine gravel.
0166 L.I. 50m towards wharf, coarse sand + fine gravel.
0167 H.I. Same location, coarse sand + fine gravel.
0168 L.I. 50m towards wharf, coarse sand + fine gravel.
0169 H.I. Same location as above, coarse sand + fine gravel.
0170 L.I. 50m in towards wharf, coarse sand + fine gravel.

0171 H.I. Same location, coarse sand + fine gravel.
0172 L.I. 50m towards wharf, beneath Irving Oil refuelling pilings, coarse sand + fine gravel.
0173 H.I. Same location below tank farm on hill, coarse sand + fine gravel.
0174 L.I. Behind refuelling piling in sample 172, coarse sand + fine gravel.
0175 M.I. Beside government wharf in stream bed possibly sewage, coarse sand + fine gravel.
0176 M.I. Far end of government wharf, finer surface sand.
0177 H.I. Alongside government wharf, sand.
0178 M.I. Along front of wharf mud by wooden crib structure, mud + sand.
0179 H.I. Inside government wharf high intertidal below breakwater, mud and sand.
0180 M.I. Same location, mud + sand.
0181 H.I. Mud flat, top 5cm, mud.
0182 H.I. Mud flat 5-15cm depth, clay and sand.
0183 H.I. Surface clay and sand.
0184 H.I. 10-15 cm depth, dark colored clay.
0185 H.I. Sand surface.
0186 M.I. Buctouche River by bridge downstream, north side, woody pulp and black sand-mud.
0187 H.I. Sand.
0188 L.I. Sand-mud from clam bed.
0189 M.I. North of bridge, downstream by an old road causeway, surface sand.
0190 M.I. Same location, subsurface sand 10-15cm.
0191 M.I. 0-5cm sand-mud.
0192 M.I. Same location, 5 to 10cm deep, anaerobic sandy-mud.
0193 L.I. Mud.
0194 H.I. Sand.
0195 H.I. Sand.
0196 L.I. Silt-mud.
0197 M.I. Sand.
0198 H.I. Sand.
0199 M.I. Surface sand.
0200 M.I. Same location subsurface sand 10-15 cm.
0201 H.I. Surface sand.
0202 M.I. Sand 5m from sample 201.
0203 H.I. Sand.
0204 M.I. Sand.
0205 2.0m Second of transect from S.W. corner of Queens Wharf, mud.
0206 5.0m Third of transect from S.W. corner of Queens Wharf, mud.
0207 5.0m Fourth of transect from S.W. corner of Queens Wharf , strongly anaerobic mud.
0208 5.0m Fifth of transect from S.W. corner of Queens Wharf, slightly anaerobic mud.
0209 9.0m Sixth of transect from S.W. corner of Queens Wharf, slightly anaerobic mud.

0210 15m Seventh of this transect, also anaerobic mud.
0211 15m Eighth of this transect, strongly anaerobic mud.
0212 16m Ninth of this transect, strongly anaerobic, mud.
0213 16m Tenth of this transect, slightly anaerobic, mud.
0214 17m Last of transect, slightly anerobic with traces of oil.
0215 2.0m Inside the S.W. corner of Queens Wharf, strongly anaerobic mud, eelgrass, and visible traces of oil, mud.
0216 2.0m Infront of fish plant, anaerobic mud.
0217 2.0m Halfway between samples 215 and 216, anaerobic mud.
0218 4.0m 5m from end of Holman Wharf, anerobic mud.
0219 4.0m Halfway between Holman and the government wharf, anaerobic mud.
0220 6.0m Halfway along western face of government wharf, anaerobic mud.
0221 7.0m S.E. corner of the government wharf, mud.
0222 9.0m Third of the way along the east face of the government wharf, mud.
0223 9.0m Two thirds of the way along east face of the governemt wharf, mud.
0224 4.0m Adjacent to the Summerside Yacht Club, mud and eelgrass.
0225 3.0m Adjacent to marina sections at Yacht Club, mud.
0226 H.I. Sample taken through 10 cm of sea ice, mud. End of dirt road heading towards March Water Bay.
0227 H.I. Same as above.
0228 H.I. Same as above.
0229 2.0m 60m from North Shore Packers wharf, brown mud.
0230 3.0m 150m from NSP wharf, patchy eelgrass bed, mud.
0231 3.0m 300m from NSP wharf, same as above, mud.
0232 2.0m 400m from NSP wharf, same as above, mud.
0233 3.0m 400m from NSP wharf, into estuary, eelgrass bed, mud.
0234 3.0m 450m into mid channel, eelgrass bed, mud.
0235 1.5m 500m from NSP wharf, surface ice too thick to sample any further, mud + sand.
0236 L.I. Along north shore, eelgrass, sand, and shells.
0237 L.I. Same as above.
0238 L.I. Sand and shells the same location.
0239 L.I. The same location, eelgrass bed, sand and shells.
0240 L.I. The same location, sand and shells.

0241 L.I. Alongside government wharf infront of NSP fish plant, sand.
0242 L.I. Same as above.
0243 L.I. Same as above.
0244 1.5m S.E. corner of wharf, mussel shells, anaerobic mud with light oil visible.
0245 2.0m Halfway along front of wharf, mussel shells, anaerobic mud with visible oil.
0246 2.0m Same as above.
0247 2.0m Downstream corner of wharf, anaerobic mud, shells.
0248 1.5m Inside wharf anaerobic mud and mussel shells.
0249 2.0m Corner of government wharf by boat slip heavily oiled mud.
0250 2.0m Same as above.
0251 2.0m Same as above.
0252 2.5m By dogleg in face of wharf, mud and visible oil.
0253 2.5m Mud with visible oil.
0254 2.5m Same as above.
0255 2.5m Halfway along jetty, mud.
0256 2.5m Same as above.
0257 2.5m Along end of government jetty, mud.
0258 1.5m North end of government wharf by slip way, and anaerobic mud.
0259 1.5m Same as above.
0260 1.5m Along front face of government wharf, anaerobic mud.
0261 2.0m Between both slipways, anaerobic mud.
0262 2.0m Same as above.
0263 1.5m S.W. corner of wharf, anaerobic mud.
0264 2.5m S.E. corner of wharf anaerobic mud.
0265 H.I. New London Bridge, red sand.
0266 M.I. New London Bridge, red sand.
0267 L.I. New London Bridge, red sand.
0268 1.0m First of transect, brown mud.
0269 1.0m Second of transect, brown mud.
0270 1.0m Third of transect, brown mud
0271 1.5m Forth of transect, brown mud.
0272 2.0m Fifth of transect, brown mud.
0273 1.5m Sixth of transect, brown mud.
0274 1.5m Seventh of transect, clay.
0275 4.0m Eighth of transect, mostly clay, mid-channel.
0276 3.5m Ninth of transect, brown mud.
0277 3.5m Tenth of transect, brown mud.
0278 3.0m Eleventh of transect, brown mud.
0279 3.5m Twelvth of transect, brown mud.
0280 3.5m Thirteenth of transect, brown mud
0281 3.5m Last of transect, brown mud.
0282 2.0m Entrance to boat harbour, mud.
0283 3.5m S.E. corner of boat harbour, mud.
0284 3.5m South of boat harbour by fishing stage, mud.

0285 2.0m Inside boat harbour, anaerobic mud.
0286 2.0m Inside boat harbour, anaerobic mud.
0287 L.I. Sand alongside fishing stage.
0288 H.I. Sand alongside fishing stage.
0289 16m First of transect, mildly anaerobic mud.
0290 13m Second of transect, mud.
0291 13m Third of transect, 100m behind fueling dolphin, mud.
0292 11m Forth of transect, mud.
0293 11m Fifth of transect, mud.
0294 10m Sixth of transect, red mud.
0295 11m Seventh of transect, red mud.
0296 12m Last of transect, dark mud.
0297 12m Same as above.
0298 12m Same as above.
0299 11m Alongside railway wharf for potatoe storage and loading, mud and visible oil.
0300 14m Along downstream side of railway wharf, 10m from wharf, anaerobic mud, red surface mud visible oil.
0301 2.0m Between Texaco marine terminal and railway wharf, anaeobic dark mud, red surface silt.
0302 10m Infront of Texaco marine terminal, slightly oiled dark mud.
0303 3.0m In front of Texaco marine terminal, silty mud.
0304 1.0m In front of Texaco marine terminal, anaerobic silty mud, trace of oil.
0305 8.0m Along face of DOT marine wharf, anaerobic mud.
0306 8.0m Along face of DOT marine wharf and ruins of wharf, strongly anaerobic silty mud, visible oil.
0307 7.0m Strongly anaerobic silty mud, visible oil, eelgrass.
0308 7.0m Same as above.
0309 8.0m Downstream side new MOT wharf 10m from wharf anaerobic, oily, silty mud.
0310 4.0m 350m downstream corner MOT wharf in yacht club boat mooring area sandy mud, eelgrass.
0311 6.0m 500m downstream from MOT wharf, sand and gravel.
0312 6.0m 750m downstream from MOT wharf, red sand, gravel and shells.
0313 H.I. Souris River Bridge, red sand, downstream on East side.
0314 L.I. Souris River Bridge, red sand.
0315 5.0m Outside breakwater, 100m from fishplant outfall pipe, clean red sand.
0316 5.0m Halfway along outside edge of breakwater, red sand.
0317 5.0m 20m off the end of breakwater, red sand.
0318 5.0m 30m along inside face of breakwater, by the finished wharf, dark sand, possible oil traces, breakwater has paved surface, is used

as a wharf.
0319 5.0m Same as above.
0320 4.0m 100m along inside face of breakwater, dark sand and sandstone.
0321 4.0m Inside breakwater by jog, muddy dark sand.
0322 4.0m Inside corner of breakwater, sand and mud.
0323 4.0m Same as above.
0324 5.0m By government wharf, muddy sand.
0325 6.0m Center channel between breakwater and railroad wharf, black mud.
0326 4.0m By black can near ferry wharf, sandy mud.
0327 5.5m 10m off end of railroad wharf, mud.
0328 5.0m Halfway along inside of government railroad wharf, anaerobic mud.
0329 5.0m Same as above.
0330 2.0m In cove by railroad wharf, slightly anaerobic mud.
0331 4.5m Off Eastpack wharf 10m from gas pumps, anaerobic.
0332 4.5m Same as above.
0333 4.0m Off end of Eastpack Wharf, anaerobic mud.
0334 3.0m Inside face of wharf, anaerobic mud.
0335 2.5m Anaerobic mud from center of small boat harbour.
0336 2.5m Anaerobic mud from center of small boat harbour.
0337 1.0m First of transect east of Bathurst Marine, sand.
0338 3.0m Second of transect eelgrass, black anaerobic mud.
0339 3.5m Third of transect, sand and mud, some eelgrass, some oil.
0340 3.5m Forth of transect, sand and mud, traces of oil.
0341 4.0m Fifth of transect, dark mud, traces of oil.
0342 4.0m Sixth of transect, dark mud, lighter coloured surface layer, sandy mud.
0343 4.5m Seventh of transect, dark mud, anaerobic.
0344 4.5m Eighth of transect, anaerobic mud, directly off far eastern end of Queen's wharf.
0345 4.5m Eighth of transect, anaerobic mud, directly off far eastern end of Queen's wharf.
0346 4.5m Eighth of transect, anaerobic mud, directly off far eastern end of Queen's wharf.
0347 5.0m Ninth of transect, directly off western end of Queen's wharf.
0348 5.0m Tenth of transect, dark and anaerobic, mud.
0349 5.0m Eleventh of transect, light red surface, sandy mud, anaerobic dark mud below.
0350 8.0m Twelvth of transect, 100m east of government wharf, anaerobic dark mud.
0351 11m Gray silty mud directly off eastern corner of government wharf, traces of oil.

0352 10.5m Red sandy mud on surface, mud with traces of oil, 14th of transect.
0353 3.5m Last of transect, brown sand some eelgrass, traces of oil, near red nun buoy.
0354 0.5m In front of National Sea Products, 100m from outfall, sand edge of eelgrass bed.
0355 5.0m Half way along western side of government wharf, 30m from wharf behind laid up car ferry, eelgrass, anaerobic, mud, oil visible.
0356 3.0m 2/3 way in along eastern side Govt. wharf by NSP loading/unloading area, muddy sand, traces of oil.
0357 2.5m Half way between Govt. wharf and Queen's wharf, sandy mud.
0358 2.0m Inside Queen's wharf in center, anaerobic mud, some eelgrass.
0359 H.I. By Queen's wharf, sand.
0360 L.I. Wood Islands, sand and gravel.
0361 H.I. West of causeway by ferry landing, red sand with pebbles.
0362 M.I. West of causeway by ferry landing, red sand.
0363 L.I. West of causeway by ferry landing, red sand.
0364 M.I. Clayey sand, 60m from last, (west of causeway by ferry landing.)
0365 H.I. Sand
0366 M.I. 75m from ferry dock, sand with muddy sand surface.
0367 3.0m From outer connected dolphin by ferry dock, dark mud.
0368 3.0m From walkway connecting last dolphin, ell-grass, dark mud, some gravel, trace of oil.
0369 3.0m From walkway connecting last dolphin, eelgrass, dark mud, some gravel, trace of oil.
0370 3.0m Walkway connecting 2nd and 3rd outer dolphins, sandy mud, visible oil.
0371 5.0m Inside of 4th dolphin from end or 1st from shore next to ferry dock.
0372 M.I. Along causeway by ferry dock, sand.
0373 3.0m 1st of transect, mud, grey/brown.
0374 3.0m 2nd of transect, mud.
0375 3.5m 3rd of transect, 100m off Irving wharf directly in front, anaerobic mud.
0376 3.5m 4th in transect, mud.
0377 3.5m 4th in transect, mud.
0378 5.5m 5th in transect, two layers light brown surface, slight anaerobic subsurface mud.
0379 12m 6th in transect, mud.
0380 16m 80m from corner Pier B, surface light brown, subsurface dark anaerobic mud.
0381 17m 8th of transect, Surface light mud, subsurface dark mud.

0382	17m	9th of transect, directly off end Pier C, mud.
0383	17m	Last in transect, dark mud.
0384	10m	1st of 2nd transect, strongly anaerobic, dark mud.
0385	10m	1st of 2nd transect, strongly anaerobic dark mud.
0386	11m	Light brown layer on top anaerobic dark mud.
0387	10m	3rd of transect, two layers, light surface dark subsurface mud.
0388	10m	4th of transect, lighter surface layer, dark subsurface mud.
0389	10m	4th of transect, lighter surface layer, dark subsurface mud.
0390	11m	5th of transect, lighter surface, dark subsurface, mud.
0391	12m	6th of transect, anaerobic dark subsurface, lighter surface mud off marine R.R.
0392	10m	Last of transect, two layers strongly anaerobic dark mud.
0393	4.0m	In front of new vessel landing area, sign of oil, sandy mud.
0394	10m	Half way along west side Pier C, dark anaerobic mud, oil visible.
0395	12m	West corner Pier B, black anaerobic mud, eelgrass, signs of oil.
0396	4.0m	Directly off Irving oil fueling wharf, anaerobic black mud, two layers, signs of oil.
0397	2.0m	100m S.E. of bridge, in New Glascow leading to Trenton, gravel
0398	2.5m	Below bridge, gravel, no mud.
0399	3.0m	100m further downstream, silt and gravel.
0400	2.5m	100m downstream from 399, alongside the ice which blocked the river, gravel.
0401	2.5m	Same as above.
0402	2.5m	Same as above.
0403	2.5m	Same as above.
0404	2.5m	Same as above.
0405	2.0m	Upstream 100m from sample 397, gravel and sand, several grabs combined.
0406	2.0m	Same as above.
0407	2.0m	Same as above.
0408	2.0m	Same as above.
0409	1.0m	100m upstream from samples 405-408, gravel adjacent to bank with marshy grass.
0410	H.I.	From bank of grass, mud with roots throughout.
0411	H.I.	Same as above.
0412	M.I.	Taken from oposite bank, sand.
0413	M.I.	Subsurface sample from 5-10cm, clay-mud.
0414	M.I.	Surface sample, shale, oil or gas on surface of water adjacent to beach, no obvious source.

0415 2.5m Off wharf, traces of oil, strongly anaerobic black mud.
0416 2.5m Same as above.
0417 2.5m Visible signs of oil, anaerobic black mud.
0418 2.5m Visible oil and algae, black anaerobic mud.
0419 2.5m By fuel pump, visible oil Fucus and other algae, black anaerobic mud.
0420 2.5m Same as above.
0421 3.0m Visible oil, with plenty of plant material, black anaerobic sandy silt, samples 422-428 from dredged material on wharf, from depths of at least 3m.
0422 3.0m Silty sand red-brown possibly brought inshore by gale. ,1m5
0423 3.0m Subsurface black sand from dredgings, sign of oil.
0424 3.0m Black sand.
0425 3.0m Black sand with some lighter surface sand.
0426 3.0m Silt-sand with visible oil.
0427 3.0m Subsurface black sand.
0428 3.0m Surface red-brown sand.
0429 H.I. Coarse sand from beach behind wharf.
0430 H.I. Coarse red-brown sand.
0431 H.I. Sand.
0432 H.I. Sand.
0433 2.0m Composite of several grabs, dark brown sand, inside of wharf, outer end of wharf irish moss and Fucus only.
0434 2.0m Same as above.
0435 2.0m Same as above.
0436 2.0m Same as above.
0437 2.0m Same as above.
0438 2.0m Same as above.
0439 H.I. Sand.
0440 M.I. Sand and gravel from beach between wharf and breakwater. Wharf only lobster fishing area.
0441 H.I. Dune sand probably awash only on spring tides, between beach and pond.
0442 H.I. Coarse black sand from beach.
0443 H.I. Same as above.
0444 M.I. Black coarse sand.
0445 M.I. Same as above.
0446 L.I. Coarse black sand, below this was a pebble stone area.
0447 L.I. Same as above.
0448 4.0m First of transect.
0449 4.0m Second of transect, mul.
0450 4.0m Same as above.
0451 4.0m Third of transect, mud.
0452 3.5m Fourth of transect, mud.
0453 4.0m Fifth of transect, mud.

0454 5.0m Sixth of transect, mud.
0455 5.5m Seventh of transect, mud.
0456 5.5m Eighth of transect, mud.
0457 5.5m Ninth of transect, mud.
0458 5.0m Tenth of transect, mud.
0459 5.0m Eleventh of transect, mud.
0460 5.0m Same as above.
0461 4.5m Twelvth of transect, mud.
0462 4.5m Thirteenth of transect, black mud.
0463 3.5m Last of transect, brown mud.
0464 H.I. Surface red-brown gravel.
0465 H.I. Subsurface sample 5-10cm depth, black gravel.
0466 5.0m From inside government wharf, black anaerobic mud, visible oil.
0467 5.0m Same as above.
0468 M.I. By slipway in front of Port Hawkesbury Yacht Club, sand and gravel.
0469 14.0m From north dolphin of Gulf wharf, black anaerobic unconsolidated mud, signs of oil.
0470 14.0m Same as above.
0471 14.0m Same as above.
0472 14.0m Same as above.
0473 3.0m South dolphin of N.S. Forest Industries, wood pulp only.
0474 3.0m Same as above.
0475 M.I. Pulp and gravel from beach infront of N.S.F.I.
0476 M.I. Same as above.
0477 6.0m Black anaerobic mud, signs of oil.
0478 6.0m Same as above.
0479 6.0m Same as above.
0480 6.0m Same as above.
0481 2.5m First of transect, anaerobic black-green mud.
0482 2.5m Second of transect, anaerobic black-green mud.
0483 2.5m Same as above.
0484 3.0m Third of transect, black-green, anaerobic mud.
0485 3.0m Fourth of transect eelgrass, black-green anaerobic mud.
0486 3.0m Fifth of transect, black-green anaerobic mud.
0487 3.0m Same as above.
0488 3.0m Same as above.
0489 4.0m Sixth of transect, black green anaerobic mud.
0490 4.0m Seventh of transect, thin film of brown silt on surface, black-green anaerobic mud.
0491 3.5m Eighth of transect, black-green anaerobic mud, away from houses at this end of transect.
0492 3.0m Ninth of transect, eelgrass and Chaetamorpha, black-green anaerobic mud.

0493 2.5m Just inside of spar buoys, marking channel, eelgrass bed of dark silt.
0494 M.I. Sand and gravel.
0495 M.I. Sand and gravel, by entrance to outer channel.
0496 M.I. Subsurface mud, 0-5cm.
0497 M.I. Same as above.
0498 M.I. Subsurface mud, 5-10cm.
0499 M.I. Subsurface black mud, 10cm.
0500 H.I. Outside of breakwater, coarse beach sand.
0501 M.I. Same location, coarse beach sand.
0502 L.I. Same location, coarse beach sand.
0503 2.5m Inside of breakwater composite of three grabs.
0504 H.I. Inside breakwater by pilot station on beach, coarse sand.
0505 L.I. Same location, coarse sand and gravel.
0506 12m Alongside government wharf, black anaerobic mud, signs of oil.
0507 12m Same as above.
0508 12m Off the end of government wharf, black mud strongly anaerobic with visible oil.
0509 11m Between government wharfs, black anaerobic mud with thin green surface layer.
0510 11m Same as above.
0511 11m Same as above.
0512 11m Same as above.
0513 4.5m Inside ferry wharf, black anaerobic mud with traces of oil.
0514 7.5m Between passenger and freight terminals, black anaerobic oily mud. ,1m5
0515 7.5m Same as above.
0516 9.0m Off end of CN freight terminal wharf, black
anaerobic mud, signs of oil.
0517 8.0m Other side of CN freight terminal, off CN oil storage tank, black anaerobic mud, signs of oil.
0518 3.0m Between Moulton and National Sea Products wharves, Fina fuel tanks between wharves, black anaerobic mud, significant oil.
0519 3.0m Same as above.
0520 1.5m Between breakwater and Salter lumber wharf, black anaerobic.
0521 1.5m Same as above.
0522 1.5m Same as above.
0523 1.5m Same as above.
0524 3.5m Inside Salter's wharf, black anaerobic mud, signs of oil.
0525 3.5m Same as above.
0526 3.5m Same as above.
0527 3.5m Inside Salter's wharf, green thin surface layer, black anaerobic mud, signs of oil.
0528 3.5m Same as above.

0529 3.0m Across from fish plant, silty-sand, composite of 4 grabs, patches of rock and silty sand.
0530 2.5m Silt-sand taken 10m from 529.
0531 2.5m Same as above.
0532 2.5m Same as above.
0533 2.5m Same as above.
0534 H.I. Gravel, silt and sand with small pebbles.
0535 H.I. Same as above.
0536 H.I. Same as above.
0537 3.5m In cove past fish plant, silt-sand, and gravel and traces of oil.
0538 H.I. S.W. corner of bridge over Alma River, sand.
0539 M.I. Same location, mud and stone.
0540 L.I. Same location, brown mud surface.
0541 H.I. Upstream, same side, mud surface layer.
0542 H.I. Same location, clay with gravel.
0543 M.I. Mud surface layer with gravel and stones underneath.
0544 L.I. Surface clay-mud.
0545 L.I. Surface clay-mud from adjacent creek marsh grass area.
0546 L.I. Subsurface sample from 5cm, grey clay with root material.
0547 M.I. Upstream from bridge, clay-mud surface.
0548 M.I. Subsurface clay-sand from same location, 5-10cm.
0549 L.I. Sandy mud from river bed upstream of bridge.
0550 H.I. Downstream from bridge above ruins of wharf, sand.
0551 M.I. Below ruined wharf, sand.
0552 L.I. Below wharf, silt-sand.
0553 L.I. 100m downstream from river bed sand ripples, sand.
0554 L.I. Gravel below 5-10cm of sand layer of sample 553.
0555 L.I. 100m downstream from river bed, surface sand.
0556 L.I. 100m downstream from river bed, surface sand.
0557 L.I. 100m downstream from low water mark, coarse sand from river bed.
0558 H.I. From beach along road, behind ruined wharf, surface sand.
0559 10m Corner of container pier, brown mud.
0560 18m Front corner of container Pier no. 1, brown-black mud.
0561 18m Same as above.
0562 19m 50m along face of container Pier no. 1, black-brown mud.
0563 20m 100m along face of Pier no. 1, black mud.
0564 20m Same as above.

0565 20m 150m along face of Pier no. 1, mildly anaerobic black mud, with traces of oil.
0566 20m Same as above. 0567 19m Along wall face between piers no. 1 and 2, two layers brown surface and black subsurface, anaerobic with significant oil, mud.
0568 19m Same as above.
0569 19m Inside corner of Pier no. 2, sample similar to nos.567 and 568.
0570 20m 50m along face of Pier no. 2, brown surface layer black subsurface anaerobic with signs of oil, mud.
0571 19m Along front of Pier no. 2, light brown s and and mud with gravel.
0572 19m Same as above.
0573 20m Along face of Pier no. 3, black anaerobic subsurface mud.
0574 20m Inside corner of Pier no. 3, significantly oiled brown surface mud, black anaerobic subsurface mud.
0575 10m Inside corner along container pier, brown surface mud with black anaerobic subsurface mud significantly oiled.
0576 15m Along side CN ferry terminal, brown mud.
0577 15m Same as above.
0578 15m Infront of CN ferry loading ramp, brown mud.
0579 15m By end of CN ferry terminal, thin brown surface layer, black anaerobic subsurface mud.
0580 6.0m Courtney Bay, 50m from shore infront of Esso tank farm, muddy sand.
0581 7.0m 100m from Imperial tank farm toward ship repair wharf, mud with clay-brown.
0582 7.0m 50m from inside end of ship repair wharf, black, brown mud.
0583 8.0m 50m along side finger pier of ship repair wharf, black brown clay-mud.
0584 7.0m 100m along pier, black-brown clay-mud.
0585 7.0m Same as above.
0586 17m 25m from corner outside face along front of ship repair wharf, brown surface mud and black anaerobic subsurface mud.
0587 17m Same as above.
0588 17m Same as above.
0589 17m 50m further along the front of ship repair wharf, black anaerobic mud.
0590 18m 30m from front end of ship repair wharf (Atlantic Towing), black anaerobic mud.
0591 7.0m Inside front of wharf, halfway to shore, brown mud.
0592 3.0m 30m from shore even with end of ship repair wharf, brown mud.
0593 3.0m 50m from Marsh Creek bridge, now filled in, sand with clay-mud.

0594 2.5m Infront of Gulf tank farm by causeway, traces of oil, dense brown mud.
0595 2.5m Same as above.
0596 3.5m 100m from Gulf, 25m from causeway, dense brown mud.
0597 3.5m Same as above.
0598 xxxx Infront of Texaco, 40m from shore, black mud heavily oiled with oily aroma.
0599 13m Behind disconnected wharf section infront of Texaco and Irving, brown mud heavily oiled.
0600 3.0m In corner of wharf area, brown surface layer, black mud heavily oiled with oily smell.
0601 3.0m Same as above.
0602 3.0m Same as above.
0603 3.5m 25m from samples 600-602 other side of wharf Irving Dock no. 4, brown mud.
0604 9.0m Outer end of Irving Dock no. 4, black-brown mud with significant oil.
0605 7.0m Inside corner of outer end of Irving Dock no. 3, possibly recently dredged sharp drop off, clay-mud.
0606 15m Inside end of Irving Dock no. 1 nearest drydock, brown surface layer black anaerobic oiled subsurface mud.
0607 15m Same as above.
0608 15m Same as above.
0609 8.0m Inshore side of Dock no. 1 by concrete section, black anaerobic mud with signs of oil.
0610 8.0m Same as above.
0611 4.5m Infront of small drydock 100m from drydock gate, sandy anaerobic mud with wood chips and significant oil.
0612 7.0m Immediately in front of drydock gate, brown silt with signs of oil.
0513 17m Directly off pier at end of large drydock area, black anaerobic mud.
0614 17m Same as above.
0615 17m Directly in front of large drydock gate, black anaerobic oily mud.
0616 17m Same as above.
0617 3.0m At the end of the wharf by marine railroad, thin brown surface layer and black anaerobic oily mud.
0618 3.0m Same as above.
0619 3.5m Other side of marine railroad alongside wharf, gravel in anaerobic black oily mud, thin brown surface layer.
0620 3.5m Same as above.
0621 3.0m End of south fitting out wharf, not in much use, thin brown surface layer black anaerobic subsurface mud.

0622 3.0m Same as above.
0623 3.0m Same as above.
0624 3.0m Same as above.
0625 3.0m Same as above.
0626 3.0m Same as above.
0627 2.5m Inside breakwater, between it and inside navigational light, brown mud.
0628 2.5m 150m along breakwater by red spar buoy (no. 18), brown mud.
0629 2.5m 100m from no. 628 25m from breakwater, black-brown mud with signs of oil.
0630 4.0m In side corner of barge loading area along breakwater, black mud with signs of oil, thin brown surface film.
0631 6.5m By outer navigational light inside breakwater, thin brown surface layer and black anaerobic oily subsurface mud.
0632 6.5m Same as above.
0633 6.0m Inside end of breakwater, brown surface layer black anaerobic oily subsurface mud.
0634 6.0m Same as above.
0635 6.0m Same as above.
0636 5.5m Outside breakwater 50m from the end, dark sand.
0637 3.0m In corner of wharf leading to Pier no. 14, sandy brown mud.
0638 8.0m Inside corner of Pier 14 60m from sample 637, grey mud.
0639 8.0m Same as above.
0640 8.0m Same as above.
0641 10.0m Halfway along Pier 14, thin brown surface layer grey subsurface mud.
0642 10.0m Same as above.
0643 1.0m Outer corner of Pier 14 brown surface layer, grey subsurface mud.
0644 9.0m Halfway along Pier 13, brown surface layer grey subsurface mud.
0645 9.0m Same as above.
0646 9.0m Same as above.
0647 9.0m Inside corner of Pier 13, brown surface layer and grey subsurface mud.
0648 9.0m Same as above.
0649 11.0m Inside corner of Pier 12, brown surface layer and anaerobic grey subsurface.
0650 11.0 Same as above.
0651 11.0m Same as above.
0652 11.0m Same as above.
0653 10.0m Halfway along Pier 12, brown surface layer and grey anaerobic subsurface mud, signs of oil.
0654 10.0m Same as above.
0655 13.0m Outer corner of Pier 12, brown mud.
0656 15.0 Along front of Pier 11 black anaerobic oily mud.

0657 15.0m Same as above.
0658 17.0m Infront of sugar refinery downstream corner, brown-black mud with signs of oil.
0659 17.0m Same as above.
0660 7.0m 30m downstream from corner of sugar wharf, black-brown mud.
0661 7.0m Upstream corner of sugar wharf, black-brown mud.
0662 7.0m Same as above.
0663 7.0m Same as above.
0664 M.I. Upstream from sugar wharf by train bridges, hard packed clay-mud.
0665 M.I. Same as above.
0666 3.0m Far end of train bridges by pilot station, black-brown mud.
0667 3.0m Same as above.
0668 3.0m Same as above.
0669 16.0m Downstream end of Pugsley wharf, black-brown anaerobic mud.
0670 16.0m Same as above.
0671 16.0m Same as above.
0672 15.0m Upstream corner of Pugsley wharf, dark mud.
0673 15.0m Same as above.
0674 15.0m Same as above.
0675 15.0m Same as above.
0676 15.0m Same as above.
0677 15.0m Same as above.
0678 13.0m Far end of area between MOT and Pugsley wharves, dark mud.
0679 13.0m Same as above.
0680 13.0m Same as above.
0681 13.0m Same as above.
0682 8.0m Downstream corner MOT wharf dark mud.
0683 8.0m Same as above.
0684 8.0m Same as above.
0685 6.0m Upstream end of MOT wharf in jog, dark anaerobic mud.
0686 6.0m Same as above.
0687 6.0m Same as above.
0688 6.0m Same as above.
0689 6.0m 25m off front of wharf by N.B. Power Comm., dark mud.
0690 6.0m Same as above.
0691 6.0m 50m upstream from long wharf, dark mud.
0692 6.0m Same as above.
0693 L.I. Between long wharf and causeway, surface mud.
0694 L.I. Same location, subsurface mud.
0695 L.I. Towards causeway from samples 693 and 694, sand and gravel.
0696 L.I. Alongside new slipway below Route no. 2 highway bridge, sand and gravel.
0697 M.I. First of transect downstream 100m from bridge, surface brown mud.

0698 M.I. Same location subsurface black clay-mud.
0699 M.I. Second of transect 10m towards bridge, brown surface mud.
0700 M.I. Same location subsurface black clay-mud.
0701 M.I. 10m towards bridge, brown surface mud.
0702 M.I. Same location subsurface black clay-mud.
0703 M.I. Fourth of transect, 10m towards road, brown surface mud.
0704 M.I. Same location subs].V
0705 M.I. Fifth of transect 10m towards road surface brown mud.
0706 M.I. Same location, subsurface black clay-mud.
0707 M.I. Sixth of transect, brown surface mud.
0708 M.I. Same location, subsurface black clay-mud.
0709 M.I. Seventh of transect 5m towards road, brown surface mud.
0710 M.I. Subsurface muddy sand by beach with stones.
0711 H.I. Eighth of transect 5m up slope of beach toward road, brown grey surface mud.
0712 H.I. Same location grey-green subsurface mud with root material.
0713 H.I. Ninth of transect 5m up slope of beach toward road, grey-brown sandy mud.
0714 H.I. Same location subsurface grey-green mud with root material.
0715 H.I. Tenth of transect 5m up slope of beach

brown coarse sand surface.
0716 H.I. Adjacent slightly lower dark brown finer sand.
0717 H.I. On river bank below bridge surface brown mud.
0718 H.I. Downstream side of bridge on river bank sand and gravel.
0719 M.I. Directly beneath bridge, brown mud.
0720 H.I. Upstream from bridge, coarse sand with gravel.
0721 H.I. First of transect, N.W. end of beach, sand.
0722 H.I. (mid) 10m east of sample 721, sand.
0723 H.I. Second of transect, 20m east of 721, sand.
0724 H.I. Third of transect going S.E. along beach, sand.
0725 H.I. (mid) Same distance along transect, coarse sand and gravel
0726 H.I. (mid) Sand and gravel.
0727 H.I. Fourth of transect east, sand and fine gravel.
0728 H.I. Fifth of transect east, sand.
0729 H.I. Sixth of transect east, sand
0730 H.I. (mid) Down from 729, coarse sand.
0731 H.I. (mid) 10m S.E. of 730, coarse sand.
0732 H.I. Seventh of transect, coarse sand.
0733 H.I. Eighth of transect, sand.
0734 H.I. (mid) Coarse sand and gravel.
0735 H.I. Ninth of transect, sand.

0736 H.I. (mid) Below 735, coarse sand.
0737 H.I. Tenth of transect, coarse sand.
0738 H.I. Same as above.
0739 H.I. Same as above.
0740 H.I. (mid) below nos. 737-739, coarse sand.
0741 H.I. Same as above.
0742 H.I. Same as above.
0743 H.I. (mid) S.E. corner of beach, sand.
0744 H.I. S.E. corner of beach, sand.
0745 H.I. (mid) First of transect, started in the middle of the beach, sand.
0746 H.I. Second of transect headed to S.E. end of beach, sand.
0747 H.I. Third of transect, sand.
0748 H.I. Fourth of transect, sand.
0749 H.I. Fifth of transect, sand.
0750 H.I. Sixth of transect along the high intertidal zone, S.E. corner of beach, sand. io.1m5
0751 L.I. transect S.E. to N.W., fine sand.
0752 L.I. Part of above transect, fine sand.
0753 L.I. Part of above transect, fine sand.
0754 L.I. Part of above transect, fine sand.
0755 L.I. Part of above transect, fine sand.
0756 L.I. Part of above transect, fine sand.
0757 L.I. Part of above transect, fine sand.
0758 L.I. Part of above transect, fine sand.
0759 L.I. Part of above transect, fine sand.
0760 L.I. Part of above transect, fine sand.
0761 L.I. Part of above transect, fine sand.
0762 L.I. Part of above transect, fine sand.
0763 H.I. Transect along high intertidal towards sample no. 745, from N.W. corner to mid beach, gravel.
0764 H.I. Same as above, and gravel.
0765 H.I. Part of the above transect, coarse sand.
0766 H.I. Part of the above transect, coarse sand.
0767 H.I. Part of the above transect, coarse sand.
0768 H.I. Part of the above transect, coarse sand.
0769 L.I. (mid) Alongside the wharf sand.
0770 L.I. (mid) Same location at 5cm depth with red shale.
0771 L.I. Alongside wharf, surface sand.
0772 L.I. Same location, subsurface 5-10cm sand with red shale.
0773 L.I. 20m from wharf, clay-black mud.
0774 L.I. 30m from wharf, surface sand black.
0775 L.I. Same location, black subsurface anaerobic sandy mud.
0776 L.I. (mid) Up the beach from 774 and 775, surface sand brown.
0777 L.I. 40m from wharf, surface brown sand.
0778 L.I. Subsurface mud 5cm, brown-black mildly anaerobic.

0779 L.I. 50m from wharf, muddy sand as surface layer.
0780 L.I. Same location, subsurface sample, 10-15cm, black sand.
0781 L.I. 60m from wharf, black surface sand.
0782 L.I. 70m from wharf, brown surface sand.
0783 L.I. Same location, subsurface sample from 15-20cm black sandy mud.
0784 L.I. 80m from wharf, surface brown sand and may contain glass from broken jar.
0785 L.I. 90m from wharf, surface is brown sand.
0786 L.I. 100m from wharf, surface is brown sand.
0787 L.I. Same location, subsurface, 25-30cm, black sand.
0788 L.I. transect up beach slope 20m from 787 surface is brown sand.
0789 L.I. 20m up slope surface brown sand.
0790 M.I. 20m up slope of beach far side old ruined wharf surface brown sand in a gravel bed.
0791 H.I. 20m up slope surface sand and gravel.
0792 H.I. 20m up slope surface brown sand.
0793 H.I. Midway down bank, black clay-mud with some root material.
0794 H.I. Same as above.
0795 H.I. Edge of river bank at bottom brown black clay-mud.
0796 xxxx Bottom of river bed, black clay-mud.
0797 H.I. (mid) The top end of the Raquette, surface sand coarse.
0798 H.I. Subsurface 5-10cm peaty mud with root structures.
0799 M.I. Coarse sand surface.
0800 M.I. Subsurface same location, clay brown sand.
0801 H.I. By oil berth surface red-brown sand.
0802 H.I. (mid) Along oil berth surface to 5cm sand.
0803 H.I. (mid) Same location subsurface 5cm black sand.
0804 H.I. Same as above.
0805 H.I. (mid) By government wharf on Raquette side between National Sea and Alan Fisheries surface sand.
0806 H.I. (mid) Subsurface 5cm black sand heavily oiled.
0807 M.I. Inside of corner of government wharf infront of Alan Fisheries, sand.
0808 M.I. Inside of corner of end of wharf coarse sand.
0809 3.5m Off inside of far pier, dark mud.
0810 2.0m Inside of government wharf, sand.
0811 L.I. transect up slope along government wharf, sand with gravel.
0812 L.I. Same as above.
0813 M.I. Same as above.
0814 M.I. Same as above.

0815 H.I. Same as above, except sand only.
0816 H.I. Same as above, also sand.
0817 M.I. From beach inside wharf, black brown sand.
0818 M.I. (low) Surface is silty mud.
0819 M.I. (low) Same location, subsurface black sand.
0820 L.I. Surface.
0821 L.I. Subsurface, 5cm dark sand.
0822 L.I. 15cm depth brown sand.
0823 L.I. Bottom of wharf along road, surface brown sandy.
0824 L.I. Subsurface 10-15cm anaerobic black sand.
0825 L.I. Same as above.
0826 L.I. (mid) Brown surface, sandy-silt.
0827 M.I. Brown-black surface mud.
0828 M.I. Same as above.
0829 H.I. (mid) Black-brown surface mud.
0830 H.I. Same as above.
0831 H.I. (mid) Brown surface sandy mud in gravel bed.
0832 H.I. Top of gradient alongside wharf by the road, sand and gravel.
0833 H.I. Same as above.
0834 H.I. Same as above.
0835 8.0m Inside corner of public wharf by marine railroad, black anaerobic oily mud and eelgrass.
0836 4.5m Inside face of public wharf, 10m from end, black anaerobic oily mud.
0837 1.0m Infront of WL Sweeney wharf, black anaerobic oily mud.
0838 3.0m 100m up from 837, 40m offshore, black mildly anaerobic mud, grey silt layer on surface.
0839 3.0m 150m offshore infront of W L Sweeney black-grey mud, from patchy eelgrass bed.
0840 1.5m Tow sample on mud banks alongside channel 250m offshore infront of W L Sweeney, grey mud.
0841 1.5m Same as above.
0842 1.5m Tow sample edge of channel grey mud with shells.
0843 3.5m Infront of upper W L Sweeney wharf, black anaerobic oily mud with algae (Desmarestia?).
0844 4.0m Infront end of Irving wharf black anaerobic oily mud with grey-brown thin surface layer.
0845 4.0m Same as above.
0846 6.0m Off outside face of public wharf 40m off (stone by wharf), black anaerobic oily mud.
0847 6.0m Same as above.
0848 6.0m Upper corner public wharf, black sandy mud.
0849 3.5m Inside public wharf, black anaerobic oily mud.
0850 1.5m Middle of the inside public wharf black anaerobic mud.

0851 1.5m Same as above.
0852 2.0m Behind ferry terminal, south end, black anaerobic mud.
0853 1.5m Same as above.
0854 3.0m Inside corner of north end of ferry terminal, black anaerobic oily mud.
0855 2.0m Along wharf face by road, 15m off black anaerobic mud.
0856 2.0m Halfway along face, same wharf, 5m off, black anaerobic mud, thin grey layer.
0857 2.0m Same as above.
0858 2.0m Same as above.
0859 1.5m Inside corner of public wharf by harbor master, black anaerobic oily mud.
0860 1.5m Same as above.
0861 3.0m Inside south corner of public wharf, black anaerobic mud.
0862 3.5m Halfway along front of public wharf, black anaerobic oily mud, grey thin surface layer.
0863 3.5m Same as above.
0864 3.5m Same as above.
0865 5.0m Outer south corner of Evangeline wharf, black-grey anaerobic mud, traces of oil.
0866 6.0m Halfway along wharf, 50m off, black anaerobic oily mud.
0867 6.0m 100m off end of the Evangaline wharf, black anaerobic oily mud.
0868 6.0m Same as above.
0869 5.0m Between Evangaline and Bond Foods 10m off, black strongly anaerobic oily mud.
0870 5.0m Same as above.
0871 5.0m Same as above.
0872 5.0m Same as above.
0873 3.0m One third of the way along the front of Bond Food wharf.
0874 3.0m Same as above.
0875 1.5m 10m off end of Bond Foods wharf, black anaerobic oily mud with eelgrass.
0876 1.5m Same as above.
0877 3.5m Inside S.E. Corner of government wharf, black oily mud.
0878 3.5m Same as above.
0879 3.0m Inside face S.E. side, black oily anaerobic mud.
0880 3.0m Same as above.
0881 3.0m Halfway along inside S.E. of government wharf.
0882 3.0m Same as above.
0883 4.0m N.E. inside corner of government wharf, black anaerobic oily mud with mussel shells.
0884 3.5m In side two thirds of the way along north side of government wharf, black oily anaerobic mud.
0885 3.5m Same as above.

0886 2.5m One third of the way along the north side, inside the government wharf, black oily anaerobic mud.
0887 2.5m Same as above.
0888 H.I. From beach north of the government wharf, coarse sand and gravel.
0889 2.0m Outside edge by breakwater on south side, sandy mud.
0890 2.0m Same as above.
0981 2.0m Same as above.
0892 4.5m From end of wharf, clay-sand.
0893 H.I. Outside south breakwater, sand.
0894 M.I. Same location, sand.
0895 L.I. Same location, sand.
0896 H.I. (mid) Behind breakwater inside wharf, by road, surface sand.
0897 H.I. Same location, subsurface, 15-20cm, sand.
0898 L.I. Same location, surface sand.
0899 L.I. Same location, subsurface, 10-15cm, sand.
0900 M.I. Head of harbor, surface sand.
0901 L.I. Same location, surface black sand.
0902 L.I. (High subtidal) Tow between Pierce's Fisheries and Irving Oil wharf.
0903 L.I. Same as above.
0904 L.I. Behind furniture store, near 902-3, coarse sand.
0905 1.5m By slipway at far end of fish plants, black-grey sandy mud, anaerobic, by causeway to north wharf.
0906 1.5m Same as above.
0907 1.5m Same as above.
0908 1.5m Same as above.
0909 3.0m First of transect by bridge in front of Irving oil depot, black anaerobic oily mud and mostly wood pulp.
0910 3.5m Alongside government wharf, by Mersey seafoods, black anaerobic muddy sand with wood fiber.
0911 3.5m Same as above.
0912 3.0m Third of transect, wood pulp only, edge of channel.
0913 3.5m From mid channel, grey muddy sand, anaerobic.
0914 2.0m Fifth of transect, alongside anaerobic ruins, grey muddy sand.
0915 3.0m Sixth of transect, 75m upstream from no. 19 black can, grey muddy sand signs of oil wood pulp and amphipods.
0916 3.0m Same as above.
0917 3.5m Grey-black anaerobic muddy sand.
0918 4.0m Eighth of transect, between 19 and 13 black can buoys, grey- black muddy sand.

0919 4.0m Same as above.
0920 5.0m Just upstream from fort point shoal, last of transect, black, grey sand.
0921 8.0m 100m outside breakwater along edge of channel, grey muddy sand, mildly anaerobic.
0922 8.0m Same as above.
0923 1.5m Brooklyn by inner crib, black strongly anaerobic oily silt, and sawdust.
0924 1.5m Same as above.
0925 3.0m Along inside face, inner Bowater Mersey wharf, black anaerobic oily silt and sawdust or pulp.
0926 8.0m Between two wharves, black anaerobic oily very liquid wood pulp.
0927 8.0m Front face of main wharf Bowater Mersey, 35m from wharf, black anaerobic oily silty mud.
0928 8.0m Same as above.
0929 4.0m Infront of the Steel and Engine, black anaerobic, oily, silt and pulp.
0930 3.0m Infront of Mersey seafoods, black anaerobic silt and pulp.
0931 3.0m Upstream end of Steel and Engine wharf near bridges, grey mud, and sand, anaerobic.
0932 6.0m 50m Outside battery point, sand with pebbles.
0933 6.0m Same as above.
0934 4.5m By lighthouse at battery point, dark sand.
0935 4.5m Same as above.
0936 4.5m Same as above.
0937 4.0m Halfway between fish plant and battery point lighthouse, black sand and signs of oil.
0938 4.0m Same as above.
0939 5.0m 20m off along the front of fish plant, black muddy sand, signs of oil.
0940 5.0m Along side of inshore wharf of NSP, black anaerobic oily mud.
0941 5.0m Same as above.
0942 5.5m 50m off along front of NSP wharves, black oily sand-mud.
0943 5.5m Same as above.
0944 5.5m Same as above.
0945 5.5m Same as above.
0946 H.I. (mid) Beach by Lunenburg foundry, no. 2, sand.
0947 4.5m Tow away from beach to 75m off, black sandy mud, signs of oil.
0948 4.5m Same as above.
0949 5.0m Tow away from shore off Rhuland marina, black oily muddy anaerobic mud.
0950 5.0m Same as above.
0951 6.0m Tow across front to Scotia trawler wharves, black mildly anaerobic oily mud.

0952 6.0m Same as above.
0953 5.5m Tow along east side of government wharf, black oily strongly anaerobic mud, eelgrass.
0954 5.5m Same as above.
0955 4.5m Tow infront of Atlantic shipbiulding wharf, black-green anaerobic oily mud.
0956 4.5m Same as above.
0957 4.5m Tow infront of Zwickers, black brown oily mud with clay.
0958 5.5m Tow along the front of Lunenburg Out fitters, black oily anaerobic mud, mussel shells.
0959 5.5m Same as above.
0960 5.5m Same as above.
0961 5.5m Tow infront of Adams and Knickle, black anaerobic oily mud with shells.
0962 5.5m Same as above.
0963 5.5m Same as above.
0964 5.0m Tow across front of Lunenburg fisheries museum wharf, brownblack anaerobic oily mud.
0965 5.0m Same as above.
0966 5.0m Same as above.
0967 5.5m Tow infront of Lunenburg, sea products wharf, black oily anaerobic mud.
0968 5.5m Same as above.
0969 6.0m Tow in front of Irving oil wharf, black anaerobic oily mud.
0970 6.0m Same as above.
0971 4.0m Along side Atlantic bridge infront of Lunenburg Foundry, black oily anaerobic mud.
0972 4.0m Same as above.
0973 1.0m By rotary, mid channel, black silty mud and mussel shells.
0974 2.5m In froNt of tour boat dock, black anaerobic silt-mud, mussel shells.
0975 5.0m By marina, in front of Rosborough Boats, black mud, anaerobic and leaf material.
0976 3.5m AYC between road and island.
0977 2.0m In front of AYC by boat moorings, olive brown surface, grey-black subsurface mud.
0978 5.0m Foot of Jubilee Road, by boat house, 50m offshore, thin brown surface, black anaerobic mud.
0979 8.0m 40m offshore Waegwoltic Club as above.
0980 4.0m Corner RNSYS brown mud with worms.
0981 4.5m Just south of sewer outfall at Pt. Pleasant Park, signs of oil and soft black anaerobic unconsolidated organic matter.
0982 13.0m South end of container pier, brown-grey sand with worms, visible oil.
0983 8.0m Inside pier B and pier A-1, black sandy silt with mussel shells and stones, visible oil.

0984 11.0m Corner NHB and power plant, black oily mud with shells.
0985 9.0m Halfway along front of NS Power wharf, black oily clay-slit.
0986 8.0m 40m off Cunard wharf, black oily silt-sand.
0987 7.0m Foot of Spring Garden Road, 40m offshore, by area derelict wharves and fill, black sandy silt.
0988 7.0m Same as above. 0989 7.0m Same as above.
0990 16.0m 25m off front of Irving oil wharf, black oily silty mud and leaf material.
0991 12.0m Same as above.
0992 12.0m Off Queens wharf 20m , black sand-mud.
0993 10.0m Between Historic Properties and Purdy's wharf, black sand, mud, trace of oil.
0994 13.0m 20m off end of Carlson's wharf, black silty clay-mud.
0995 13.0m Same as above.
0996 13.0m Same as above.
0997 11.0m Halfway inside between Pier 2 and Jetty 8, black, tracer of oil and mussel shells.
0998 16.0m S.E. corner of Jetty no. 1, black mud with mussel shells.
0999 16.0m Inside Jetty 2, black mud with mussel shells, trace of oil.
1000 3.5m In corner by tide gauge, Jetty no. 4, black oily mud with shells, and stones.
1001 7.0m 10m from N.E. Corner of Jetty no. 5, black sandy silt with trace of oil and mussel shells.
1002 4.5m Dartmouth Back Cove 75m from shore, black unconsolidated silt, trace of oil.
1003 4.5m Same as above.
1004 4.5m Same as above.
1005 4.5m Same as above.
1006 2.0m Behind Dartmouth Marine Slips, where river comes in black oily silty mud.
1007 2.0m Same as above.
1008 4.5m N.W. Corner of Coast Guard wharf, 30m off, black oily-silt and gravel.
1009 5.0m Between floating drydock and graving yard, black oil and sand-silt.
1010 9.0m Black oily mud anaerobic between Pier 6 and Pier 7.
1011 13.0m S.E. corner of Volvo dock, black fibrous material.
1012 12.0m Halfway along face 3 of Pier 9, black silt-mud.
1013 18.0m Eastern end of land fill area, black silty mud.
1014 18.0m Same as above.
1015 18.0m Same as above.
1016 15.m South end of Navy Island by road to Gulf, grey-brown sand.

1017 1.5m DYC 50m from fueling dock, dark brown silty mud.
1018 1.5m Same as above.
1019 4.0m Between Gypsum wharf and adjacent shore, grey-black gritty silt.
1020 9.0m N.E. corner BIO jetty, black silty-mud.
1021 10.0m Inside BIO jetty 15m from wharf, black silt-mud.
1022 8.0m Off bow of Acadia, toward buoy, gravel and brown-black silt.
1023 3.0m Inside small craft area BIO, brown black sandy silt.
1024 4.0m By north stack of NS Power, Tufts Cove, 30m offshore, brown -black silty mud.
1025 4.0m Same as above.
1026 1.5m South of power plant near outfall, grey-black gravel, silt-mud with mussel shells.
1027 4.0m Inside DREA wharf, two thirds the way in, in the middle, black anaerobic mud with trace of oil.
1028 4.0m Same as above.
1029 4.0m Same as above.
1030 4.0m Same as above.
1031 4.0m Same as above.
1032 7.0m Halfway between DREA and Porters, 45m offshore, black silt-mud.
1033 7.0m Same as above.
1034 12.0m Between jettys MOT wharf, 35m off main wharf, grey-black clay-silt.
1035 12.0m Same as above.
1036 12.0m Same as above.
1037 7.0m In front of NS hospital, 35m offshore, brown black mud.
1038 2.5m In front of MOBIL wharf, grey-black clay-mud with gravel.
1039 7.0m North end of Georges Island, brown-grey mud.
1040 7.0m Same as above.
1041 3.0m Residential, few small fishing boats, black silt.
1042 4.0m Anaerobic, black silt-mud.
1043 4.0m Same as above.
1044 4.0m Black slightly anaerobic silty mud, some clam shells on surface.
1045 3.5m Infront of marina, black silty mud.
1046 3.5m Between wharves, down from marina.
1047 4.0m N.E. corner of government wharf, black silty mud.
1048 4.0m Same as above.
1049 4.5m 30m off face of government wharf, mildly anaerobic black silt-mud.
1050 5.0m 40m downstream from government wharf, brown-black silt-mud.

1051 3.0m Between government wharf and private wharf, sandy silt.
1052 4.0m Towed sample intowards government wharf starting 75m off, brown-black sandy silt.
1053 4.0m Same as above.
1054 4.0m Same as above.
1055 3.0m Brown muddy sand with small rocks. 1056 3.0m Same as above. 1057 3.5m Tow towards bridge to back cove, silty mud
from channel, mildly anaerobic.
1058 3.5m Same as above.
1059 3.5m Same as above.
1060 4.5m Tow in front of residential area, sand.
1061 6.0m Two layer brown silty surface, black brown subsurface, silty sand.
1062 6.0m Same as above.
1063 1.0m Back Cove, sand and gravel.
1064 1.0m Same as asbove.
1065 2.0m Channel by bridge into Back Cove, sand and gravel.
1066 1.5m Back Cove tow away from the government wharf, sand and gravel.
1067 1.5m Same as above.
1068 3.0m Tow upstream into cove silty sand, black.
1069 3.0m Same as above.
1070 3.0m Same as above.
1071 H.I. Sand.
1072 M.I. Sand.
1073 H.I. Sand beach alongside road at East River Pt.
1074 M.I. Sand.
1075 L.I. Sand.
1076 H.I. Along roadside, root laden fine silt-sand.
1077 H.I. From small beach area, sand.
1078 M.I. Sand.
1079 L.I. Sand.
1080 1.5m Subtidal.
1081 1.5m Same as above.
1082 L.I. Alongside wharf next to fish plant, brown surface, black subsurface.
1083 L.I. Black subsurface mud, 5cm depth, gravel and shells.
1084 2.0m In front of fish plant, black silt slightly anaerobic mud, eelgrass and fucus.
1085 2.0m Tow along red channel spar buoy, fine light brown sand, eelgrass and ascophyllum.
1086 3.0m Tow along side of no. 5 black spar buoy, fine light brown sand, gravel and sand dollars.
1087 3.0m Same as above.
1088 2.0m Gravel, rock and light brown sand.
1089 0.5m Coarse sand and gravel sea urchin and small roots.
1090 0.5m Rocks, graveland sand crabs.
1091 1.0m Sand.

1092 1.0m Same as above.
1093 1.0m Last of transect 100m from shore,. gravel and coarse sand.
1094 3.0m 30m from government wharf, silty brown-black mud.
1095 3.0m Same as above.
1096 3.0m Same as above.
1097 3.0m same as above.
1098 2.0m 100m away from fish plant towards parish hall, black anaerobic mud.
1099 2.0m Same as above.
1100 2.0m Same as above.
1101 2.0m Same as above.
1102 H.I. Bayswater beach, sand.
1103 M.I. Same location, sand.
1104 L.I. Same location, sand.

1105 2.5m Tow 30m off wharf toward cable sign east side, brown-black mud.
1106 7.0m 100m along transect, brown-black mud.
1107 9.0m Brown-olive surface layer black subsurface mildly anaerobic mud.
1108 9.0m Same as above.
1109 13.0m Mid channel, mud as above.
1110 8.0m 200m from far shore near to edge of channel, mud with some rocks.
1111 6.0m Edge of channel, 100m from shore, Littorina gravel and stone.
1112 6.0m Same as above.
1113 2.0m 30m from shore, strongly anaerobic mud, eelgrass and rhizoids.
1114 3.5m Halfway between cable sign and government wharf, eelgrass bed with Agarum and Demarestia, anaerobic black mud.
1115 4.0m 20m off front of government wharf, gravel rocks and mud-sand.
1116 4.0m Fine brown silt on black mud, boulder bottom.
1117 3.5m 300m from wharf, 75m from shore, mussel shells and two layer mud.
1118 3.5m Same as above.
1119 6.0m In channel 100m offshore, three quarters of the way from government wharf to Black Point, mildly anaerobic mud with clam shells.
1120 2.0m Head of harbor below church, 50m away from end of ruined wharf, black anaerobic fiber outlet of main river 500m away.
1121 3.5m 100m downstream along western edge of channel, strongly anaerobic, black unconsolidated mud.
1122 4.0m 100m downstream, black-brown soft mud.
1123 4.0m Same as above.
1124 4.0m Same as above.
1125 5.0m 100m downstream, anaerobic, soft olive-brown mud,
fucus.

1126 5.0m 100m downstream, strongly anaerobic, black soft mud.
1127 4.0m Next to small island west side of channel, strongly anaerobic soft black mud, eelgrass and a few pebbles.
1128 7.0m Mid channel, blak anaerobic soft mud and kelp.
1129 6.0m Mid channel where small rive9 comes in from the west side, abaft boat, soft black anaerobic mud.
1130 6.0m Last of transect along channel, abreast where road forks on east shore, black soft anaerobic mud.
1131 1.5m First of transect across channel starting across at the western shore, gravel and stones in black mud, 30m from shore.
1132 1.5m Same as above.
1133 6.0m 130m from shore, black soft anaerobic mud.
1134 8.0m Two thirds across channel soft black anaerobic mud.
1135 1.0m 40m from east side, black soft mud.
1136 1.0m By red spar buoy, sand and rocks.
1137 1.0m 100m in towards government wharf of Moulton Harbor, sand and rocks.
1138 1.0m By channel entrance to harbor, rock and sand.
1139 2.0m Off end of government wharf, silty and anaerobic.
1140 3.0m Inside wharf, 100m from fish plant, sand-clay.
1141 3.0m Directly in front of fish plant by red spar buoy, black anaerobic clay-mud.
1142 1.0m In front of houses next to fish plant, black, clay-mud, eelgrass.
1143 1.0m Same as above.
1144 0.5m Head of cove by fish plant, black mildly anaerobic clay mud.
1145 1.0m First of new transect, silty mud and dense eelgrass, Ulva.
1146 1.5m 100m towards government wharf, brown silty mud and eelgrass.
1147 1.5m Adjacent to shoal area, gravel and rocks in mud also kelp.
1148 1.5m Same as above.
1149 1.0m Gravel rock and mud, kelp.
1150 1.0m Mud and gravel and kelp.
1151 1.0m Same as above.
1152 1.5m 100m from front of wharf, are preparing to dredge, eelgrass mud and silt.
1153 1.5m Same as above.
1154 3.0m Along face of government wharf, eelgrass mud and shells.

1155 2.0m Inside wharf eelgrass and black mud.
1156 L.I. Sand.
1157 M.I. Sand.
1158 H.I. By dirt road out to lighthouse, sand.

ALPHABETICAL INDEX OF PORTS

Aboujagane River, N.B.	40
Aldouane Bridge, N.B.	24
Alma, N.B.	78
Arisaig, N.S.	67
Bathurst, N.B.	14
Bayswater Beach, N.S.	124
Bedford Basin, N.S.	110
Blandford Head, N.S.	122
Borden, P.E.I.	42
Buctouche Bridge, N.B.	37
Caraquet, N.B.	16
Chance Harbour, N.B.	90
Charlottetown, P.E.I.	54
Chatham, N.B.	22
Chester, N.S.	116
Cocagne River, N.B.	38
Daigle Bridge, N.B.	25
Dalhousie, N.B.	12
Dartmouth, N.S.	111
Deep Cove, N.B.	82
Digby, N.S.	94
Dupuis Bridge, N.B.	41
East River Point Beach, N.S.	118
French River, P.E.I.	48
Georgetown, P.E.I.	59
Glenholm - Great Village, N.S.	35
Halifax, N.S.	109
Hantsport, N.S.	32
Ingonish Ferry, N.S.	76
Lismore, N.S.	66
Liverpool, N.S.	103
Lockeport, N.S.	101
Lorneville, N.B.	84
Lower West Pubnico, N.S.	99
Lunenburg, N.S.	105
Malignant Cove, N.S.	68
Malpeque, P.E.I.	46
Margaretsville, N.S.	34
Meteghan, N.S.	96
Mispec, N.B.	88
Mooneys Creek, N.B.	26
Musquash River, N.B.	92
Newcastle, N.B.	20
New Glasgow, N.S.	64
New London Bridge, P.E.I.	50
North Rustico, P.E.I.	52
North Sydney/Sydney, N.S.	74
Northwest Arm - Halifax, N.S.	107

ALPHABETICAL INDEX OF PORTS (cont'd)

Petit De Grat, N.S.	72
Pictou, N.S.	62
Point Tupper, N.S.	70
Port Bickerton, N.S.	130
Port Hawkesbury, N.S.	69
Richibucto, N.B.	27
Rous Point, N.S.	120
Saint John, N.B.	80
Shediac Bridge, N.B.	39
Sheet Harbour, N.S.	128
Ship Harbour, N.S.	126
Shippegan, N.B.	18
Souris River Bridge, P.E.I.	56
Summerside Harbour, P.E.I.	44
Wallace, N.S.	30
Wood Islands, P.E.I.	61
Yarmouth, N.S.	97

ALPHABETICAL INDEX OF PORTS BY REGION

New Brunswick

Aboujagane River, N.B.	40
Aldouane Bridge, N.B.	24
Alma, N.B.	78
Bathurst, N.B.	14
Buctouche Bridge, N.B.	37
Caraquet, N.B.	16
Chance Harbour, N.B.	90
Chatham, N.B.	22
Cocagne River, N.B.	38
Daigle Bridge, N.B.	25
Dalhousie, N.B.	12
Deep Cove, N.B.	82
Dupuis Bridge, N.B.	41
Lorneville, N.B.	84
Mispec, N.B.	88
Mooneys Creek, N.B.	26
Musquash River, N.B.	92
Newcastle, N.B.	20
Richibucto, N.B.	27
Saint John, N.B.	80
Shediac Bridge, N.B.	39
Shippegan, N.B.	18

Nova Scotia

Arisaig, N.S.	67
Bayswater Beach, N.S.	124
Bedford Basin, N.S.	110
Blandford Head, N.S.	122
Chester, N.S.	116
Dartmouth, N.S.	111
Digby, N.S.	94
East River Point Beach, N.S.	118
Glenholm - Great Village, N.S.	35
Halifax, N.S.	109
Hantsport, N.S.	32
Ingonish Ferry, N.S.	76
Lismore, N.S.	66
Liverpool, N.S.	103
Lockeport, N.S.	101
Lower West Pubnico, N.S.	99
Lunenburg, N.S.	105
Malignant Cove, N.S.	68
Margaretsville, N.S.	34
Meteghan, N.S.	96
New Glasgow, N.S.	64

ALPHABETICAL INDEX OF PORTS BY REGION (cont'd)

Nova Scotia (cont'd)

North Sydney/Sydney, N.S.	74
Northwest Arm - Halifax, N.S.	107
Petit De Grat, N.S.	72
Pictou, N.S.	62
Point Tupper, N.S.	70
Port Bickerton, N.S.	130
Port Hawkesbury, N.S.	69
Rous Point, N.S.	120
Sheet Harbour, N.S.	128
Ship Harbour, N.S.	126
Wallace, N.S.	30
Yarmouth, N.S.	97

Prince Edward Island

Borden, P.E.I.	42
Charlottetown, P.E.I.	54
French River, P.E.I.	48
Georgetown, P.E.I.	59
Malpeque, P.E.I.	46
New London Bridge, P.E.I.	50
North Rustico, P.E.I.	52
Souris River Bridge, P.E.I.	56
Summerside Harbour, P.E.I.	44
Wood Islands, P.E.I.	61